1802
XLIV

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FLIGHT

and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB — JULY 8th, 1943

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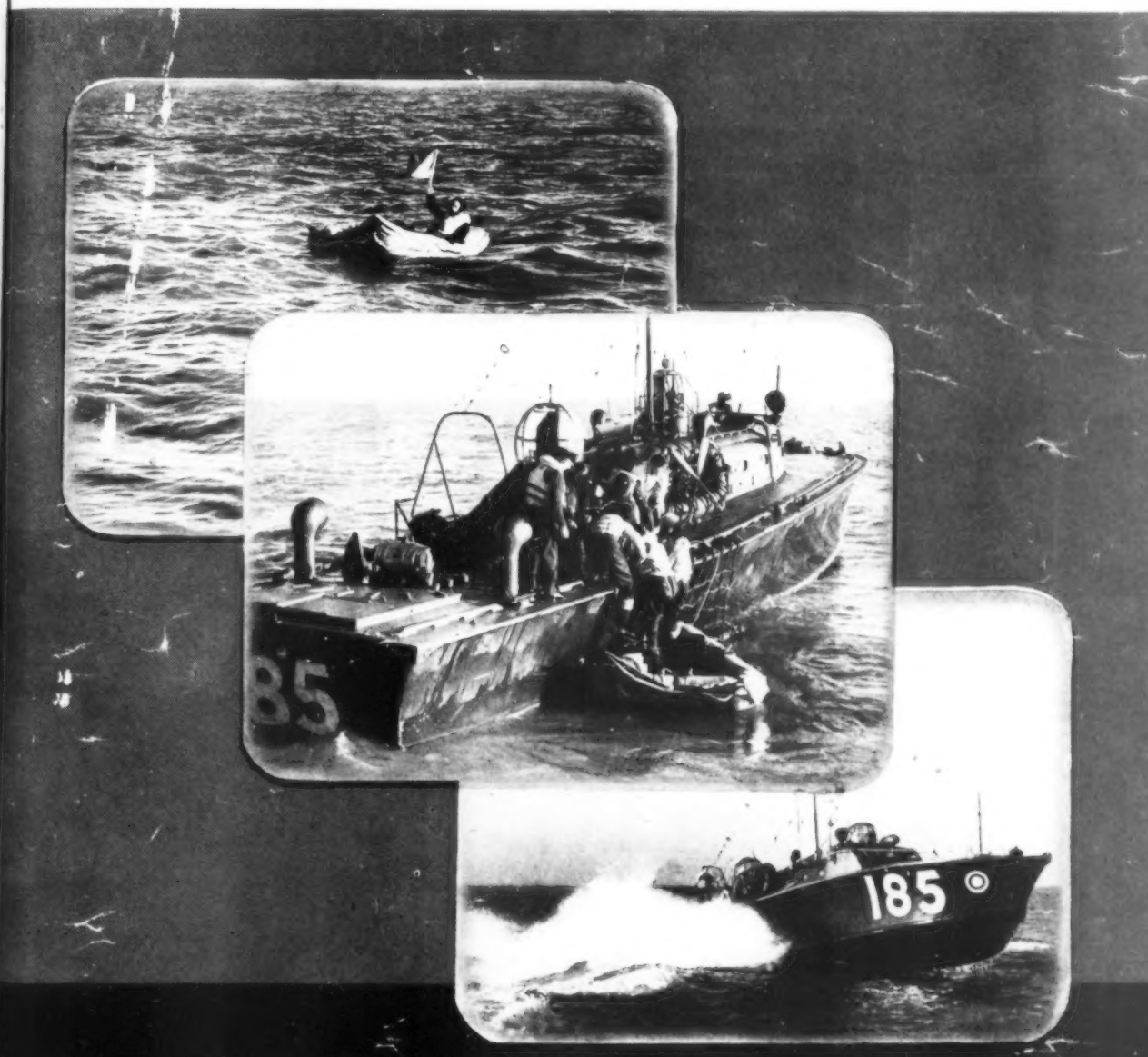

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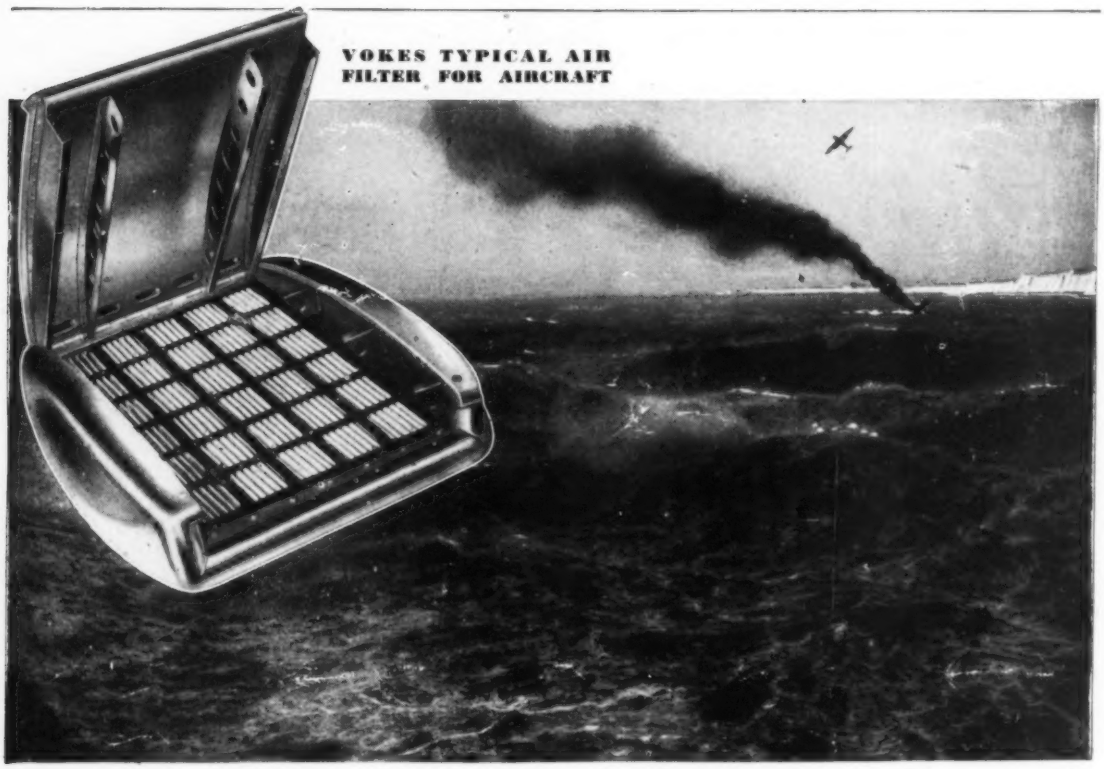

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FLIGHT and The AIRCRAFT ENGINEER

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The Outlook

9,000 Miles Saved

WHEN the victorious advance of the Eighth Army started, the prospect of opening the Mediterranean once again to British shipping began to dazzle the minds of everyone in this country, not to mention far-sighted Americans. A statement issued by Allied Air Headquarters in North Africa on June 30th proclaims that this is now an accomplished fact.

The Mediterranean and the Suez Canal have always been regarded as one of the lines of communication on which British Empire strategy has been based. At this happy moment it is salutary to cast one's mind back to earlier days when the possibility had to be faced that this line might be closed. The entry of Italy into the war on the side of Germany had been expected, but the loss of the French fleet as a partner had not. Men began to talk gloomily about the possibility of steaming round the Cape, thinking more of the connection with India and Australia than of the link between the British Isles and Egypt. The idea seemed fraught with despair. That an Army in Egypt could be kept supplied by means of the Cape route looked well-nigh impossible. To meet such an emergency a force had been stationed in Syria and Palestine under Generals Weygand and Wavell, but again the defection of France defeated the original plans. One consequence was the loss of Greece and Crete, and a long delay before the original Army of the Nile could be built up into the great Eighth Army.

From Great Britain to Suez through the Mediterranean is some 3,000 miles, while round the Cape it is 12,000 miles. U-boats haunted the route, though the conquest of Somaliland cut down their sphere of operations. The strain on British shipping was enormous, and how the job was carried through to a successful conclusion is one of the wonders of this war. The Axis leaders must have thought that it never could be done. Despite all difficulties it was done.

Now the Mediterranean is open once again. The possession by us of airfields all along the northern coast of Africa means that our shipping sails always under an umbrella of fighters by day and night.

Only those in the secrets of the Allied High Command can say whether the Middle East is still such an important base for an offensive as it was a few months ago. To all appearances, at least as they appear to the man in the street, North-West Africa is now the more important base, and that can be supplied direct from Great Britain and from the American continent. But to have opened once again the direct line to India and Australia is a success of prime importance. Of at least equal moment is the saving in shipping by our recovered ability to by-pass the Cape of Good Hope. Allied grand strategy is based on shipping, and the setting free of the enormous tonnage needed for the Cape route is almost the equivalent of sinking a record number of U-boats in the Atlantic—and in May and June we did that also.

Towards the Setting Sun

IT has not taken long for action to follow Mr. Churchill's words in Washington that the United Nations were now strong enough to press the war against Japan as well as that against Germany and Italy. General MacArthur has started an offensive of an amphibious nature by landing troops on various islands. The day of defence by bombers alone has passed, and now the naval and land forces of the United Nations are playing their due parts in the new offensive.

That does not mean that aircraft have lost any of

their importance in the war against the Power whose boastful emblem is the Rising Sun. Each landing and each advance has to be covered by Allied fighters, while the bombers no doubt go ahead to blast a way as they did at Alamein and in Tunisia. The first Japanese riposte has also been by air, and already furious battles have been fought in the skies, much to the advantage of the Americans.

What is more, the plan of General MacArthur's moves seems to be dictated by the position of existing or possible airfields. Naval forces and transports are needed to move the troops to each island, and the troops have to clear it if necessary and to consolidate their positions; but the object in each case appears to be the airfields. Bases are needed nearer to those of the enemy so that Allied bombers can attack him more easily, and in some cases the newly acquired fields will enable fighters to fly with the bombers and protect them. The first stage of the advance is of necessity a series of island-to-island moves, pushing back the Japanese and removing any remaining threat to the shores of Australia.

The Glider Flight Across the Atlantic

HISTORY was made when, last week, a Douglas DC-3, known in the U.S. Army Air Forces as the C-53 Skytrooper, and in the R.A.F. Transport Command as the Dakota, towed a Waco CG-4A glider from Montreal to England. The total distance was 3,500 miles and the total flying time 28 hours; but as no information has been published about the route, other than the fact that it was made "in stages," it is difficult to assess the true merits of the flight.

One thing does stand out clearly: the flight was a considerable strain on the crews, particularly on the pilots of the glider, who had to watch the tug and/or the tow rope the whole time. It is a very good thing that "records" of this sort should be made in wartime. This particular flight does not prove that the time is near when large quantities of supplies are transported across the Atlantic is this way. Before that can come about great improvements will have to be made so that the crews may be relieved of some of the strain of being on the alert every second of the flight.

Nevertheless, the flight is to be applauded, since it has shown that with the right equipment the payload of a power-driven aircraft over long distances can be greatly increased by carrying the extra load in a trailer.

From the military point of view the significance of the flight rests in the fact that the glider could have been carrying troops instead of the "vaccines for Russia, radio, aircraft and motor parts," and could have cut adrift and landed anywhere.

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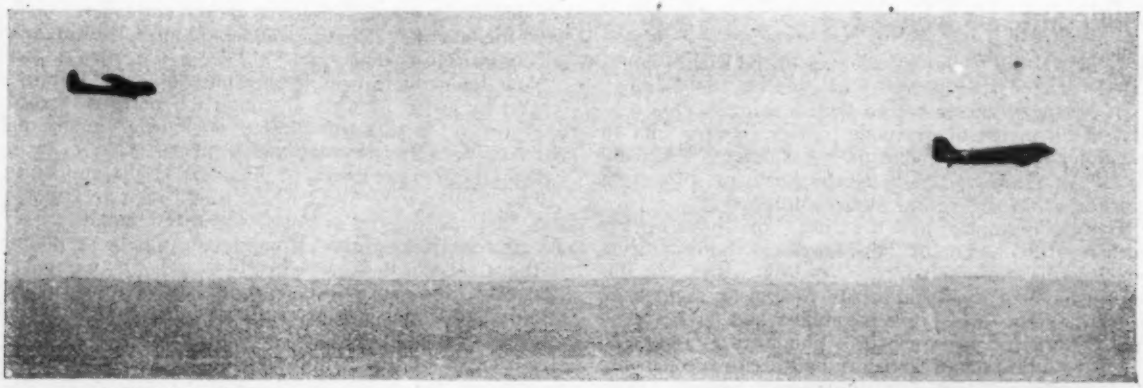
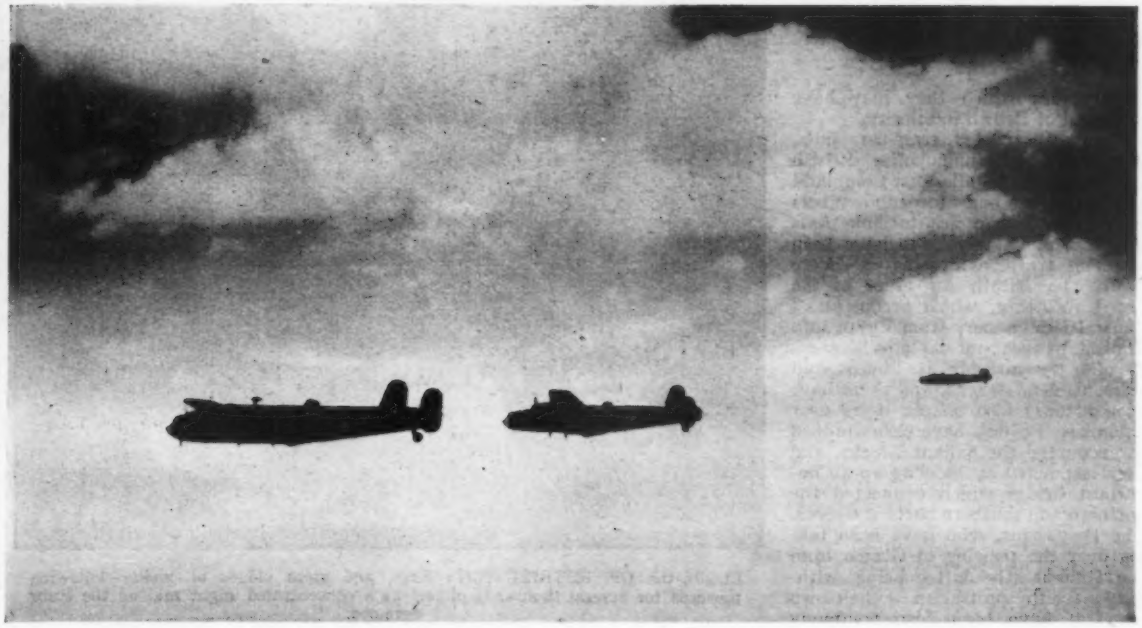


Sqn. Ldr. R. G. Seys, D.F.C. (left), captain of the glider, and Sqn. Ldr. Gobeil, his co-pilot. They are examining the tow rope before leaving on the first stage of their flight to Great Britain.

ANOTHER FIRST EVER: The Atlantic has now been crossed by towed glider, the journey from Montreal to the terminal airport in Britain taking 28 flying hours. A load of 1½ tons of freight can be carried in the Waco CG-4A glider and a Dakota was employed as the tug. The Nylon tow rope used has unique elastic properties. Towing attachments were stressed to withstand a load of 20,000 lb. For the Atlantic crossing the towing aircraft was modified. Special tanks for extra fuel were so made that they could be jettisoned intact, with their contents. (Above) The air train on its way.

Flt. Lt. W. S. Longhurst, captain of the DC-3 tug, with (right) his co-pilot, Flt. Lt. C. W. N. Thompson. Mr. H. G. Wightman also travelled as radio officer and P/O. R. H. Wormington was flight engineer.



RUHR WRECKERS: Handley Page Halifaxes being tested by their aircrews in readiness for the night's operations.

WAR in the AIR

Air Warfare on the Russian Front: Italy's Plight: General MacArthur Advances in the Pacific

LEAFLET RAID: A Caudron C440 (Goeland)—once of Vichy France, now of the R.A.F.—dropping leaflets over Syria telling the inhabitants of the Allied victories in North Africa.

ANXIETY about where the Allies would strike next evidently made the Germans hold their hand in Russia. The expected summer offensive was held back, though some demonstrations against Leningrad at one time looked like real business. The Russians likewise were content to wait on events. The probability is that winter gives them the best chance for making an advance, but it is also quite likely that their High Command knew what the British and American plans were, and so decided not to incur the cost of an attack until the Germans were definitely assailed from the West.

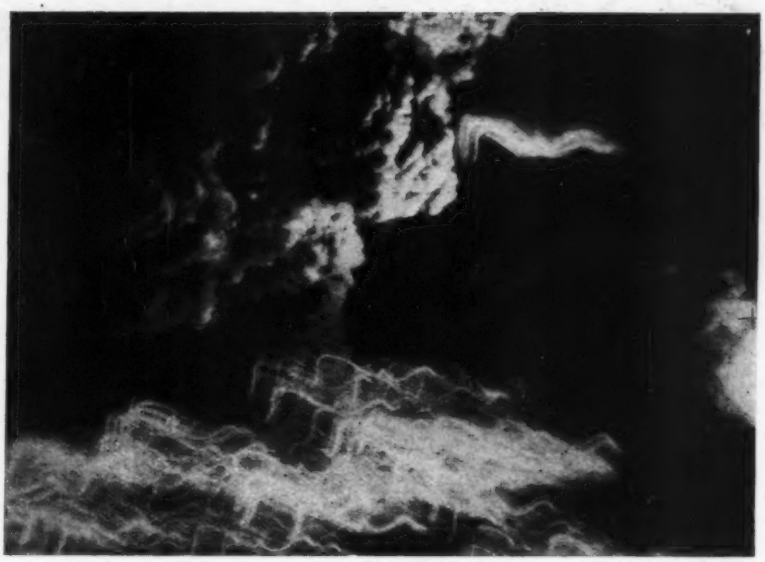
In the meantime, the Russian bomber force devoted most of its energies to disrupting communications and concentrations behind the German lines. The Red Air Fleet is this summer in the novel and happy position of having a superiority of machines over the *Luftwaffe* forces opposed to it. The latter contain the majority of the German bombers, but it is not backed by a due proportion of fighters, as most of those are retained in the West. Accordingly the Russian bombers have not been unduly harried in their attacks on railway stations and similar targets behind the German lines. Railways and stations are not very difficult to repair after bombing, but, of course, the greater the damage the more difficult is the repair work, and the Russians have kept the German repair gangs busy. The German Generals can never be sure that a cut in their communication system may not be made the occasion for a Russian attack, when it might be all-important to hurry up reinforcements, but the means of doing so might be wanting.

The Axis is in a similar state of anxiety in the Mediterranean. The day and night pounding of Sicily and Sardinia, to say nothing of Naples, Leghorn and other places on the mainland of Italy, seems to foreshadow an Allied advance in the western Mediterranean, and evidently the Italians expect their country to be invaded. Their state of mind is quite comic, when one remembers the bombastical way in which Mussolini sent some air squadrons over to take a share in the honour of bombing Britain into surrender. The idea that Italy could ever be invaded by British and American troops must have seemed wildly preposterous to the Italians in those days—though their airmen who survived the encounter over Kent with the Spitfires of the City of Edinburgh Squadron must have been jolted out

WAR IN THE AIR

of any idea which they may have nourished of British inferiority.

The western Mediterranean, however, does not monopolise British attention. The Middle East Command has been sending torpedo-bombers across the Aegean Sea to sink Axis shipping, and lately there have been bombing raids on airfields in Greece itself. The Ninth Air Force of the American Army, which accompanied General Montgomery from Egypt into Tunisia, has sent out daylight bombers to raid the airfields at Eleusis and Hassani, near Athens, and there have been attacks also on air bases near Salonika. Leaflets have been dropped to encourage the gallant Greeks, and they responded by blowing up an important bridge which connected the northern and southern parts of Greece. The Bulgarians, who have been taking over the policing of Greece from the Italians (the latter being withdrawn for the protection of their own country) have been correspondingly depressed. The Bulgars have a bad reputation for atrocities when their blood is up, and they are old enemies of the Greeks. Now they are beginning to wonder if the avenging arm of the R.A.F. and the Americans is about to fall on them. Conscience, it is said, makes cowards of us all, and the Bulgars have won the respect of no party in the present war, not even of the Germans or Italians. No one would pity them if they were treated to a dose of Allied bombs. The elder men among them must remember how No. 47 Squadron bombed their retreating armies in the Kosturino and Kresna Passes in 1918. The havoc those little biplanes wrought was immense, but what were the bombs of 1918 compared with those of the R.A.F. today!



CLOSE-UP OF RETRIBUTION: Fires, and great clouds of smoke billowing upwards for several thousands of feet as a concentrated night raid on the Ruhr develops.

Advance in the Pacific

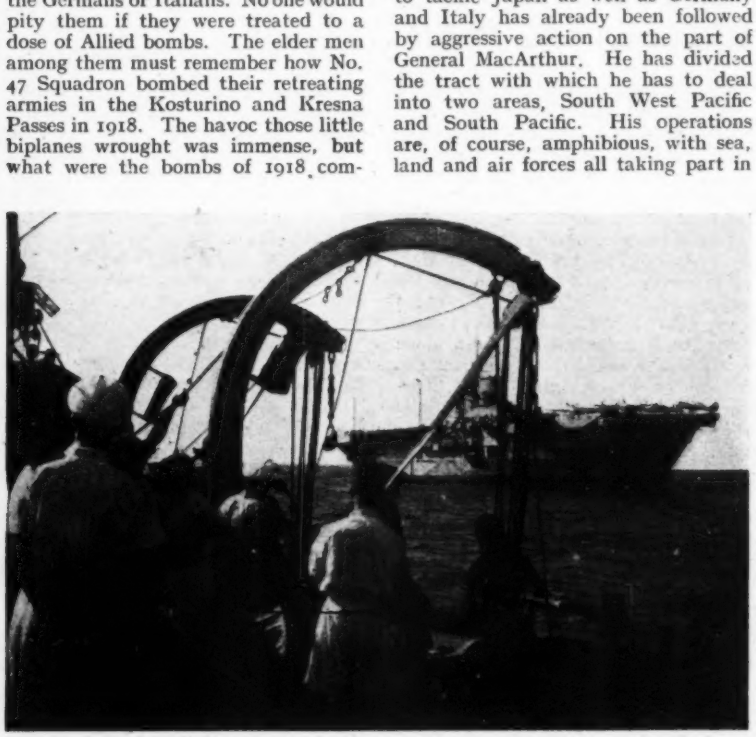
THE Prime Minister's recent statement in Washington that the United Nations had reached a pitch of strength which would permit them to tackle Japan as well as Germany and Italy has already been followed by aggressive action on the part of General MacArthur. He has divided the tract with which he has to deal into two areas, South West Pacific and South Pacific. His operations are, of course, amphibious, with sea, land and air forces all taking part in them. The American fleet has been brought up to formidable strength, for the six battleships disabled at Pearl Harbour have now returned to the line, and still more modern battleships took part in the naval actions fought near Guadalcanal last winter by Admiral Halsey.

Since Japanese resistance in the island of Guadalcanal was overwhelmed last February, the land troops of General MacArthur have not been much in the news, but now they have come into their own again, for they have made landings on various islands and attacked the Japanese. Of course, these landings had to be covered by naval and air escorts.

The Japanese reacted by more raids on Darwin, but the defending Spitfires prevented them from doing serious damage. The enemy's attempts to interfere with the American landing on Rendova Island, near New Georgia, in the Solomons group, was an even more disastrous failure. Reports say that Japanese aircraft numbering up to 110 or so, including Zero fighters, Mitsubishi medium bombers, and Aichi dive-bombers, made a series of attacks on the American naval forces. Torpedo-bombers hit the transport *McCawley*, a vessel of 7,700 tons, after she had disembarked her troops, but did not succeed in sinking her. A Japanese submarine had to finish her off with a naval torpedo, but no American lives were lost.

In the meantime the American aircraft cover had been busy with the Japanese attackers, and was reported to have shot down at least 65 out of the 110. This was a striking victory, won at a cost of 17 U.S. machines missing. Perhaps some of the pilots will yet be found to be safe.

The news so far received is only the



FLOATING AIRFIELD: H.M. aircraft carrier *Indomitable* seen through the davits of its attendant destroyer.

ENEMY AIR LOSSES TO JULY 3rd

	Over G.B.	Continent	Middle East	N.W. Africa
June 27	1	5	7	8
" 28	0	2	0	12
" 29	0	6	3	4
" 30	0	0	0	4
July 1	0	4	0	4
" 2	1	0	13	1
" 3	0	2	0	0
	2	19	23	33

Totals: West, 7,066; Middle East, over 5,416; North West Africa, 2,210.

beginning of a new chapter in this world war, and further developments may be expected without too much delay.

U-boat Losses

WHILE the Americans advance among the Solomon Islands, and Australians and Americans combine in a land movement on New Guinea which, it is hoped, will end in the capture of the Japanese bases at Lae and Salamana, the severe set-back which the U-boats have endured in the Atlantic is also a very significant piece of good news. In May no less than 30 U-boats were certainly destroyed, and as a result the remaining boats were recalled to their bases. At least one Allied convoy crossed the Atlantic without being attacked.

News has recently been published of a fight between more U-boats and the escort of a convoy which lasted for two days, though the date has not been published. As the convoy sailed from the American continent air cover was provided by machines of the Royal Canadian Air Force, Eastern Command, which sent out Hudsons, Venturas, Liberators and Catalinas. The approach to Britain was protected by Liberators, Sunderlands and Halifaxes of R.A.F. Coastal Command. The interesting point is that the gap in the middle, which is out of the reach of the shore-based aircraft from either side, was taken over by the convoy carrier, H.M.S. *Archer*. She sent out Swordfish T.S.R. machines and Martlet fighters, and they scored one certain victory, sinking one U-boat without any doubt, unaided by surface craft. This is the first time that aircraft from a convoy carrier have been officially credited with such a success. A T.S.R. did the heavy work, but a fighter came up to drive the crew away from their gun by its fire, and the fighter then flew off to bring up a destroyer, which picked up 13 survivors. It really looks as if the solution to the convoy problem has been found at last. Another headache for Hitler!

The suburbs of Cologne on the east bank of the Rhine, Kalk and Deutz,

OVER THE HILLS AND FAR AWAY: Kittyhawks of the Royal Canadian Air Force disporting themselves over the Alaskan mountains.

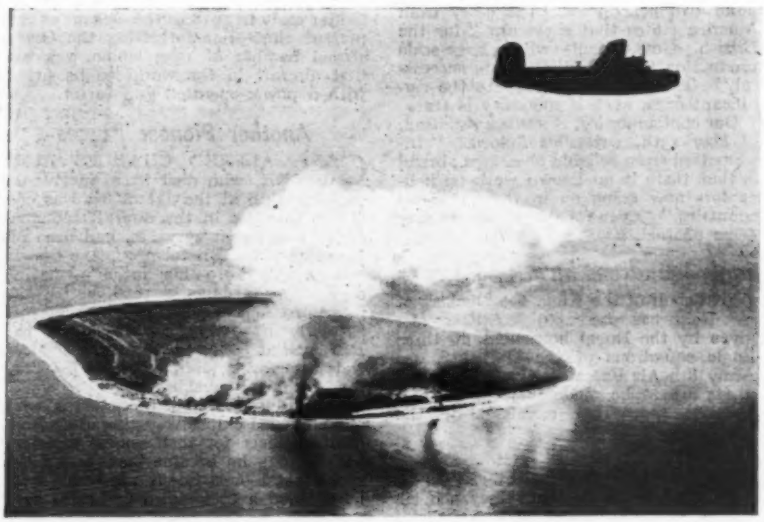
BRITISH & U.S. AIR LOSSES to JULY 3rd

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. A.rica A'crft.
June					
27	0	1	0	0	2
28	0	31	0	0	2
29	0	0	1	0	2
30	0	0	2	0	2
July					
1	0	8	5	0	0
2	0	0	0	5	0
3	0	32	2	0	0
	0	64	10	5	8

Totals: West, 6,691; Middle East, about 2,102; North West Africa, 777.

were subjected to three-quarters of an hour of concentrated bombing by R.A.F. heavy bombers during the week-end. They were full of factories, one of which was a major source of the supply of diesel engines for U-boats. It is interesting to note that the defences were strong at the beginning of the attack, but towards the end they became almost negligible. That suggests that most of the A.A. guns and their crews had been knocked out, and it seems that the fire brigades also found the job too much for them to tackle efficiently, as many fires were seen burning next morning.

The U.S. Eighth Air Force was also busy during the week-end, and one formation of Fortresses (of course flying by day, as they always do) went to La Pallice, a trip of about 1,000 miles. The place is memorable for the sally of the *Scharnhorst*, which was attacked there in daylight by R.A.F. Bomber Command. The Americans reported direct hits on lock gates there which lead to the submarine pens. The place is able to accommodate 16 U-boats. This raid evidently came as a surprise to the enemy, for there was no opposition, and the Americans suffered no casualties. Other daylight raids were made on Le Mans and Nantes, and in these eight bombers were lost.



NIPPING THE NIPPONS: A U.S. Liberator over Nauru Island during an attack on the phosphate works and airfields.

HERE AND THERE

New Russian Fighter

IT is reported that the LA5, the new Russian fighter aircraft, has already shot down several German fighters. This new Russian type is now in mass production.

Aircraft Production in Britain

THE output of aircraft produced in Britain alone is more than the amount produced by the whole of Germany for the *Luftwaffe*, according to Mr. Bevin, Minister of Labour, in a speeech recently. He congratulated British women on their contribution to the war effort.

Civil Business

THERE is a general impression that civil aviation has come to a complete standstill in the British Isles since the war. That this is hardly the case is revealed by official statistics showing the number of civil aircraft still on the register.

It is somewhat surprising to find that they totalled no fewer than 438 aircraft on June 1st. Of these 38 were classed as "foreign," presumably American, and two were unclassified. B.O.A.C. are shown with 99 aircraft, nine of them foreign, which leaves 90 of British manufacture. They must have lasted a long time, since no civil types have been built for some years.

Regular air lines other than B.O.A.C. account for a total of 31 aircraft, five of them foreign. Evidently internal (and perhaps external) aviation is not quite dead!

Most surprising of all, the greatest number of aircraft still on the register is in private ownership. They reach the impressive total of 157, five owned by women. Twelve are of foreign type, all owned by men.

UNFAMILIAR BREECHES BUOY: An officer of the Merchant Navy, about to go for a flight under the "swapping points of view" scheme, seems to be slightly puzzled by the parachute harness.

That Helicopter Fable

PUBLIC imagination was stirred by the announcement some time ago that Great Britain had ordered helicopters from America, to be used, it was inferred, in connection with the anti-U-boat campaign. It was assumed that the Sikorsky helicopter (which is obviously the only American type which can be meant) was far enough advanced to be used at once. No official statement that this is so has been made, and it is rather significant that the United States Navy has revealed that not only is it not buying any helicopters, but it is not even experimenting with them. It is interested, but content to leave development work to the U.S. Army Air Forces. The helicopter may be in time to help in the anti-submarine war, or it may not.

Work Progressing

OTHER American firms besides the Vought-Sikorsky are interested in helicopter development. The Vultee Aircraft Corporation has announced that it is working on a helicopter which is intended to be a post-war model. Cargoes, Inc., has signed a contract with the ubiquitous Mr. Henry J. Kaiser to build two helicopters. The story from America states that these are "for the British Government—with large-scale production to follow if they are successful." The last four words are the significant ones, even if the story is true.

Our contemporary, *American Aviation*, of May 15th, writes as follows: "Information from reliable observers abroad is that there is no known work on helicopters now going on in the European countries." Even reliable observers may come unstuck now and again.

Eagle Squadrons have R.A.F. Crests

ON behalf of the King, the Duchess of Kent has presented R.A.F. crests, given by the Royal household, to three Eagle squadrons of the United States Army 8th Air Force. Miniatures of the crests are to be made into badges and will be worn by members of the squadrons.

Officers of Indian Air Force

THE policy of promoting officers from the ranks of the Indian Air Force has proved a complete success so far. In the general duties branch (aircrews) 28 per cent. of the officers are promoted airmen; in the technical branch 30 per cent., and in the equipment branch 25 per cent.

Air Strength in Pacific

THE Allied air strength in the Pacific has greatly increased, reveals Dr. H. V. Evatt, Attorney-General and Minister for External Affairs for Australia, who is now in Britain. As a result of the practical help that Britain and the United States have given to Australia, the position in the Pacific had changed from one of deepest gloom to one of hope and reasonable confidence, he said.

Scholarships for Canadians

THE governing body of Trinity Hall, Cambridge, has completed plans whereby three Canadian airmen each year will be granted two-year scholarships up to £100 per annum. The airmen selected will receive their normal service pay and allowances in addition.

Only men whose academic qualifications would permit them to obtain a B.A. degree within two years are eligible. The scholarships are open to men who would otherwise be discharged from the service on medical grounds and returned to Canada.

"Salute to the R.A.F."

THIS was the title of a sixpenny brochure produced by Boulton Paul Aircraft, Ltd., 10,000 copies of which were sold during Wolverhampton's "Wings for Victory" week and raised £256 for the R.A.F. Benevolent Fund.

It illustrates the firm's association with the R.A.F. during the past 25 years, from the production of the Bobolink fighter early in 1918 to the Defiant of the present time—not forgetting the Overstrand bomber of 1935 which was the first aircraft in the world to be fitted with a power-operated gun turret.

Another Pioneer Passes

CAPT. ALFRED CHARLES BURGOINE, who died from pneumonia on June 13th at the age of 63, was one of the pioneers in the aircraft industry and, for the past 23 years, had been on the staff of the Bristol Aeroplane Co.

Apprenticed to his father's marine engineering business in 1896, he became interested in the construction of aircraft as early as 1909 and served in the R.N.A.S. and the R.F.C. during the last war, afterwards joining the Air Ministry in a technical capacity.

Capt. Burgoine joined Bristols in 1925 and travelled extensively abroad as technical engineer for their engine division, but in 1935 he became manager of the sheet metal department until, in 1940, he suffered a breakdown in health as a result of air raids.

After a period of convalescence in Devonshire, he returned to duty on experimental work in the engine division.

TYPHOON-BOMBER SQUADRON

2,400 h.p. Cannon-armed Fighter-bomber Dive-bombing at 650ft. per Sec. : 500 lb. Blast Bombs Equal to 1,000-pounders

WITH the exception of those designed especially for height cover, all fighters now carry bombs, thus continuing the good work first started in the last war by the low-flying contact patrols.

The latest of the fighters to be so used is the Napier Sabre-engined Hawker Typhoon. Armed with four 20 mm. cannon and carrying two 500 lb. special blast bombs, this machine is, without doubt, the most fearsome weapon yet devised for close support of the army or for use against tactical targets. The new blast bombs are equal to twice the weight of general-purpose bombs.

Visiting a squadron of these fighter-bombers, one gets an immediate "tails-up" impression. "We are the boys that lay it on thick," so to speak. The squadron, which is not of a great age, started life with one Hurricane IIB and one Typhoon under its present

"Flight" photograph.

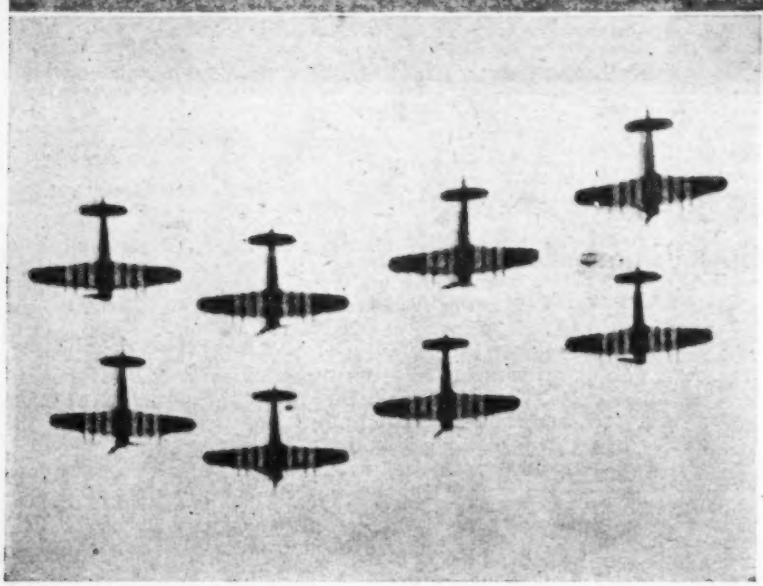
BOMB, CANNON AND C.O.: Sqn. Ldr. Dennis Crowley-Milling, who commands the squadron, in the cockpit of his Typhoon.

"Flight" photograph.

OFF THE DOLLY: Raising a 500 lb. bomb by the aid of portable winches known as "hockey sticks."

D

TYPHOON-BOMBER SQUADRON



"*Flight*" photographs.

(Above) With the crack of the starting cartridge and a quick cloud of blue smoke the 2,400 h.p. Napier Sabre springs to life. (Left) Two sections of Typhoon bombers put up a little show which in quality is reminiscent of the pre-war R.A.F. displays.

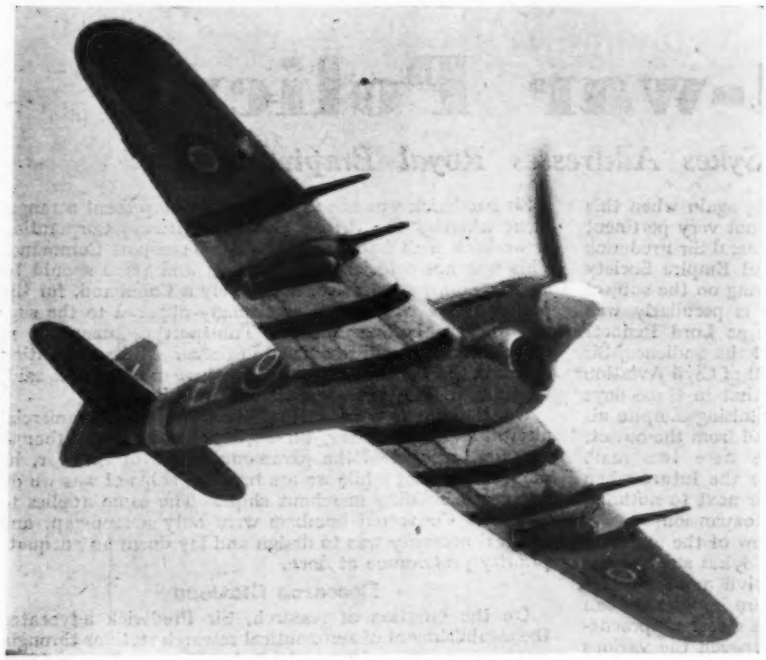
"*Flight*" photograph.

The squadron's unofficial crest. The squadron's work certainly is a headache for anything or anybody belonging to the Axis.

commanding officer, Sqn. Ldr. Dennis Crowley-Milling, D.F.C. and Bar.

Sqn. Ldr. Crowley-Milling decided to tackle his problem from the target end first. He sailed in a coastwise convoy, and, after studying the enemy's methods of attack, he applied his new-found knowledge to the training of his pilots in a new technique. Tactics were worked out, and a considerable number of practice attacks were made. Then the same tactics were tried with the Typhoon with 500 lb. bombs. The culmination of their training came when 16 pilots of the squadron scored 54 direct hits in one day's practice. Of eight bombs dropped by the C.O. on a target ship no fewer than six were direct hits.

Operational flights began on February 10th this year. The C.O. and three other pilots—four is the usual number to work as a section—attacked an armed trawler off the Dutch coast. This



"Flight" photograph.

Despite its heavy loading when carrying bombs the Typhoon is still extremely manœuvrable.

first show was also the first success, for the trawler was left with a pronounced list and with smoke and steam belching from it. The first land targets to be attacked by the squadron were the dispersal points of Alkmaar airfield, in Holland. That was on March 22nd. Six of the pilots saw their bombs burst among the huts.

April saw a number of raids on enemy airfields, harbours and docks in occupied territory. Railways, factories and a steel works at Caen were also bombed.

Caught Refuelling

One of their best shows was a nicely timed attack on Abbeville airfield on May 13th. Escorted by Spitfires and Typhoons, so that they might pay all their attention to the bombing, the "Tiffy Bombers" (as they are affectionately known) found a number of Focke Wulf FW 190s refuelling after intercepting a Fortress raid. The 190s were nicely grouped round the petrol bowsers and presented almost ideal targets. Subsequent photographs taken by a photographic reconnaissance unit showed that considerable slaughter had been done. Obviously this is not a squadron to collect a big record of enemy aircraft destroyed in air battles, since most of the attacks are made against ground targets. The C.O.'s private score, collected before forming this squadron, is eight enemy aircraft shot down. These were made up of one Heinkel 111, three Junkers 88s, three Messerschmitt 109s, and one Messerschmitt 110.

"Flight" photograph.

Tightening the fingers of the rack which hold the bomb steady in the streamlined bomb rack under the Typhoon's wings. This is known as crutching down.

It would be thought, on the face of it, that putting two 500 lb. bombs on external racks would lower the performance of the Typhoon considerably. Actually, the pilots say, the top speed is lowered only very slightly. Climb does suffer somewhat, since the wing loading has gone up to 44 lb./sq. ft.

Two sections of four aircraft each has been found the most practical attacking force, and they are covered by an escort of Spitfire Nines.

Where the enemy is known to be using radiolocation apparatus, the approach is made at ground level, with a final sharp climb up to the appropriate height over the target. Here the machines peel off out of the sun to dive at an angle of 60/70 degrees to attack their selected targets.

Imagine the scene. Cannon are roaring. The Typhoons are soon over the 400 m.p.h. mark and scream in consequence; then—just as the target comes in line with each nose—down go the instantaneous-fused 500 lb. blast bombs. At this point some 470 m.p.h. is showing on the airspeed indicators. The terrific airspeed, over 650ft. per second, precludes accurate flak; the big bombs ensure hitting, and—at the end of the attack—the Typhoon is still a very fast fighter armed with four 20 mm. cannon and well able to look after itself in a scrap.

No Air Brakes

Full pans of ammunition are carried for each gun, despite the bomb load. No air brakes are fitted or required, neither are the flaps lowered during the dive. A point of interest is that, despite the all-up weight of the Typhoon, the pilots say they are able to turn inside the Focke Wulf 190.

Certainly the new Tactical Air Force of Fighter Command have "got something" in the "Tiffy Bomber" and its tactics. When the big show comes it will make the Ju 87s look like two cents. The pilots are sure that they have the finest thing ever, and are quite prepared to carry out these attacks in moonlight as well as daylight.

The foregoing bears out the contention of our contributor "Helldiver," who, in recent issues of *Flight*, declared that the day of the dive bomber was not over.

Like so many of these air weapons which appear to be out of date, it is really a question of adapting the principle to modern aircraft.

Where penetration of armour is required while bombing accurately from only a medium height, the Typhoon bomber seems to be an ideal weapon. The initial speed imparted to the bomb by the rate of descent during the dive of the Typhoon is roughly two-thirds that of the speed of sound.

Air Transport

Post-war Policy

Sir Frederick Sykes Addresses Royal Empire Society

"ARE we going to be caught napping again when this war is over?" That question, that very pertinent question, was asked by Major-General Sir Frederick Sykes, M.P., at a meeting of the Royal Empire Society last week, when he addressed the gathering on the subject of air transport. Sir Frederick Sykes is peculiarly well qualified to speak on this topic for, as Lord Bennett (who presided at the meeting) reminded the audience, Sir Frederick was the first Controller-General of Civil Aviation (from 1919 to 1922). He pointed out that in those days much pioneering work was done in organising Empire air routes, but that civil aviation was starved from the outset, and the result was inevitable. There were two main reasons: we had no approved plans for the future when the war finished, and we did nothing, or next to nothing, to develop research and assist civil air expansion.

As was but natural and proper, in view of the audience which he was addressing, Sir Frederick Sykes stressed the importance to the British Empire of civil aviation. He said: "If there is one factor that is more important than any other in our post-war policy, it is a closer rapprochement, economic, political and social, between the various members of the British Commonwealth of Nations. This is where rapid communications are destined to play such an important part. Air transport is essential for the maintenance of a State as a first-class Power, especially when that State is an Empire with overseas territories.

"One of the great difficulties about co-ordinating the policy of our scattered territories is to get responsible people together for purposes of consultation. Misunderstandings which take weeks of correspondence can often be smoothed out in a few hours by personal contact. We know what a difference the visits of the King to the Mediterranean and of the Prime Minister to Washington, Moscow and Algiers have made to the conduct of the war."

Sir Frederick said that the advantages of rapid travel were not confined to those high up in office. He would like to see large parties of schoolboys and girls carried to various parts of the Empire during their holidays or even see British children staying at Australian schools for a time and Australian children similarly being at British schools. Such an arrangement would do a tremendous amount of good.

Trade and Speed

For trading purposes it was absolutely necessary to have a fast commercial air service. Speed and long range were the essence of air transport. Heavy goods would continue to travel by rail, sea and road, except to inaccessible areas.

There was at present a supreme opportunity for the Empire to make a start with its plans. The problem was to arrive at an organised air policy. Domestic and Imperial policy should be dealt with concurrently and at once, and those of the United Nations and other countries as soon as possible.

Turning to an aspect of which he has had personal experience, Sir Frederick Sykes said that one lesson we had learned from the past was the necessity of separating civil air transport from the control of a Service Ministry. The two sides of aviation, military and civil, dealt with fundamentally different problems, and the Secretary of State for Air had his hands too full to cope with both. Sir Frederick, it may be recollected, was not only our first Controller-General of Civil Aviation, he was also our first Chief of Air Staff (1918-19). He thus knows both departments from the inside, and his voice, added to the many others that have been raised recently advocating that after the war commercial aviation should be taken away from the Air Ministry, thus carries considerable weight.

Sir Frederick was not satisfied with the present arrangement whereby the British Overseas Airways Corporation is working with and under the Air Transport Command. This was not sufficient, he thought, and there should be an Air Transport Service, not merely a Command, for the period of the war. He was strongly opposed to the suggestion that because the Air Transport Command is in uniform now, it will remain so in peace. Military aviation either in the British Empire or elsewhere must not, he said, continue in the guise of civil air transport.

On the question of finding time to build commercial aircraft during the war, Sir Frederick said that although everyone recognised the paramount claim of the war, he pointed out that while we are building ships of war we do not cease building merchant ships. The same applies to aircraft. Converted bombers were only a stop-gap, and the real necessity was to design and lay down an adequate priority programme at once.

Research Stations

On the question of research, Sir Frederick advocated the establishment of aeronautical research stations throughout the Empire. He thought that the needs in various parts of the Empire could not possibly be covered by one central research station. There should, however, be a co ordinated plan to ensure that the Commonwealth automatically would benefit from technical discoveries.

Technical air education should be included in the curriculum of our system of education. So far this has not been done, and there would be need to create chairs of aeronautics at several Universities.

Sir Frederick Sykes did not believe that one "chosen instrument" was sufficient. He said there should be more than one and no monopoly. A system might be devised of four or five or even more concerns operating to Australia, Africa, North America, South America and the continent of Europe. Shipping and industry generally should be able to make their contributions to these chosen instruments. Any Imperial air policy, Sir Frederick said, must break away from the idea of the different portions of the Empire working in watertight compartments. This should be considered as one entity and the policy evolved must be agreed by all members of the Commonwealth. There should be independence of thought and unity of aim, and it was to be hoped that there would be no minority reports. The matter was urgent, and if we failed to take the lead the Dominions might be driven into making their own arrangements, with disastrous results to Imperial unity.

The Imperial Air Conference would have a vast problem to consider. It should lay down on broad lines an agreed air policy and establish a suitable body, such as an Imperial Board, to carry the policy into effect. It was very important that the correct position should be reached concerning the freedom of the air. Sir Frederick thought that a free air policy, combined with domestic reservations, appeared the best, and would help air expansion. In that case the arrangements we might come to with Canada, South Africa, New Zealand and elsewhere would resemble that at present in existence with Australia, where the B.O.A.C. delivers mail and passengers at Port Darwin and the Qantas Company conveys them to their various destinations in Australia.

Another major issue after the war was what form international control of flying should take. Some form of control there must be, and there were incidental issues such as standards of airworthiness, qualifications of pilots and crews, ownership of airfields, route lighting, radio, meteorology, etc. He thought that, having agreed on an Empire

air policy there should be no real difficulty in coming to an amicable understanding with America, Russia and China. We might, he thought, reserve air traffic within the Empire as internal. America would similarly operate her own internal routes and her routes to her overseas territories. Russia and China would do the same, as would probably Holland, Belgium and France. There might also be a Scandinavian group.

In Europe the problem of free passage was made a little less difficult now than in 1919, owing to the fact that aircraft now had much longer range. Thus, air traffic would be able to fly from England to Alexandria non-stop and would merely require right of "innocent passage" over French and Italian territory.

Miss Strickland, who has been through the blitz on Malta, expressed the hope that Malta would not be overlooked when formulating future Empire air route policy.

Professor Gill (who is secretary of the Royal Society) agreed with the lecturer about research and technical education, but pointed out that operational research had much to offer aviation, of which full use should be made.

Sir Frederick Handley Page introduced a note of realism by quoting a statement made recently in America to show that if all cargo from San Francisco to Australia had to be carried by air, a personnel 40 times as large would be required. The ships needed to victual the route would suffice to carry the cargo! He thought it important to realise the limitations of air transport.

Air Transport for London

10,000 Passengers per Day

A PAPER under the above title, by Mr. R. F. Lloyd Jones and Mr. Graham Dawbarn, directors of Norman and Dawbarn, was read by Mr. Lloyd Jones at the National Gallery, London, last Friday in connection with the exhibition of the London Regional Reconstruction Committee of the R.I.B.A.

The first part of the paper was devoted to an outline of the classes of aircraft in use or in sight, with their main characteristics. Operational conditions were reviewed next. So far as London was concerned, the authors of the paper expressed the view that four types of air transport would be required: Long-distance, serving the Empire, the Americas and, perhaps, Russia; intermediate distances overseas; short distances overseas; and internal.

The different classes would require different airports. It was estimated that London will require airport accommodation for 10,000 passengers daily. It was also assumed that an airport will be able to cope with a traffic density of one aircraft every ten minutes. That implied three separate airports to cater for London's air traffic. The longer the distance the less need there would be for the airport to be close to the City centre. Shorter distances would require airports as near as possible. It might be that for the long-distance routes London would have to be looked at as a part of England, and the airport might not come within the area considered by the London Regional Reconstruction Committee. It might be necessary for Londoners to make a journey of an hour or more to the nearest of these airports.

For the shorter air journeys, whether external or internal, smaller airports and shorter runways might suffice. The long-distance ones would need at least 2,500 yards runways, but the short-distance ones might be content with 1,200 to 2,000 yards.

In their exhibition, and in their Second Interim Report, the London Regional Reconstruction Committee envisaged an "in-city" airport immediately adjoining the Isle of Dogs, which they developed as a great marine dock area. It was most appropriate that sea and air transport should be linked, and there were direct links with main line and underground railways, and provision for an extension on to the airfield of the G.P.O. private tube. After allowing for zoning, by which the approach and take-off runs at the ends of each runway were unobstructed above an angle of 1 in 40, runway lengths were obtained of about a mile. Most, if not all, of the approaches were arranged over naturally open areas, such as provided by the loops of the Thames and by the Lea Valley to the north. The area, which was within two miles of the Bank of England, has been heavily blitzed, and it was thought that the Committee was to be congratulated on its foresight in appreciating the possibilities of such a site.

The authors of the paper considered that this one airport would be quite inadequate to cope with London's air traffic, and others would be needed. They were glad to see that the Fairlop and Heston airports had not been overlooked in the scheme. With several airports around the perimeter each could serve a sector of the world which lay on its respective side of the City centre.

AIRWORTHINESS OF CIVIL AIRCRAFT

THE Air Registration Board, which recently published a small handbook on "The Duties of a Licensed Aircraft Engineer," has now brought out a similar publication entitled "Notes on the Regulations Governing the Airworthiness of Civil Aircraft."

To some extent these handbooks are related in that it is necessary for the licensed aircraft engineer to be conversant with the regulations governing airworthiness before he can carry out his duties. Apart from this, the information which they contain is invaluable to all operators, owners or would-be owners of civil aircraft which are or may be registered in Great Britain and Northern Ireland.

Even before the war it was extremely difficult to extract from the mass of Statutory Orders, Regulations, and Notices to Ground Engineers the relevant portions which it was essential that the operator of aircraft should know in order to comply with them all. There are no fewer than seven official publications to which it is necessary to refer if the information has to be extracted from official documents, and the fact that at the present time many of these are unobtainable makes the handbook of greater value.

This handbook, while referring, by marginal notes, to each of the various official publications, gives the essential requirements. It is, therefore, a simple matter for the reader to find what these are, but if he feels so disposed, or it seems necessary, he can refer to the Statutory Orders or Directions or Regulations for further particulars.

Although by the title it would appear that the book refers only to matters of airworthiness, it in fact deals with the registration of aircraft, their identification and markings, the classification in accordance with the International Convention, and similar matters, which, although not directly questions of airworthiness, are necessary in order that the significance of the various Airworthiness Regulations may be appreciated.

An interesting inclusion is a facsimile copy of a Certificate of Airworthiness, a document to which reference is often made, but with the appearance of which very few are familiar.

In addition to the actual Regulations, the book contains an explanation of the procedure which must be adopted in order to meet the requirements, and it will be most helpful to those concerned not only with the operation but with the repair and maintenance of aircraft. It should also be noted that one section deals with the issue of a Certificate of Airworthiness for an ex-Royal Air Force aircraft, which seems to indicate that the Board anticipate the purchase of ex-Royal Air Force aircraft for civil purposes.

The handbook will be available from any office of the Board or from any bookseller, price 2s. 6d.

Fifty-sixth of the Latest Recognition Series

Aircraft Types and

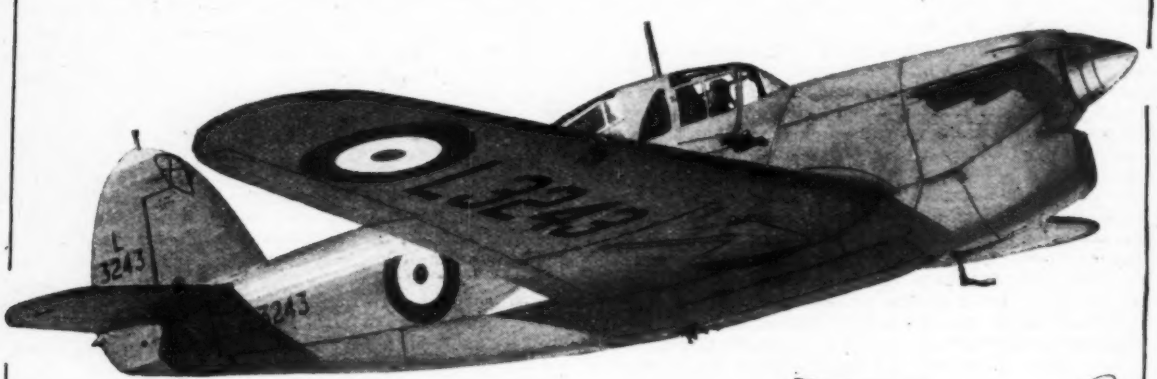
HAWKER HENLEY

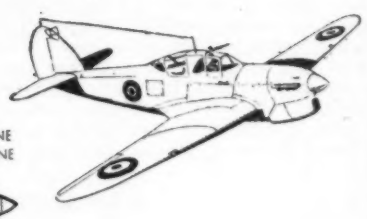
ORIGINALLY designed as a light single-engined two-seater bomber, to the same specification as the Fairey P4/34, the Hawker Henley was chosen for target towing when the advent of the fast monoplane fighter and bomber rendered the slow biplane target towing virtually useless.

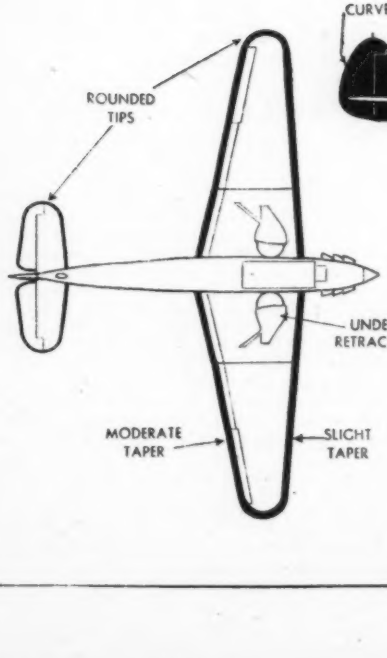
Powered by a Rolls-Royce Merlin II engine of 1,030 h.p., the Henley has a top speed of 272 m.p.h. at 17,000ft. with its drogue in tow. Its normal operating speed is 235 m.p.h. at 15,000ft., service ceiling 27,000ft. and cruising range 950 miles. Incidentally, an experimental two-seater fighter with a power-driven four-gun turret, similar to that of the Boulton Paul Defiant, was a development of the Henley built by Hawkers just before the outbreak of war, but it never went into production. The Henley, in fact, was a very promising and efficient aircraft which has been wasted. To make adequate room for its intended bomb-load, the combined radiator and oil cooler was mounted under the nose, as shown, in the same position as that occupied in the Typhoon, and proved to offer surprisingly little drag.

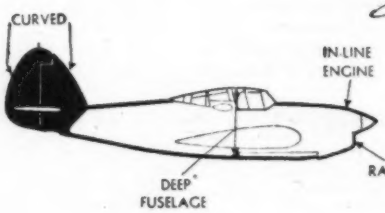
Constructionally, the Henley follows accepted Hawker principles, the fuselage having its main framework of steel tubes with metal covering as far as the cockpit, and the rest fabric covered over wooden formers and stringers. The wings are all-metal, with flush-riveted metal skin covering, and are fitted with split trailing-edge flaps. Ailerons and tail unit are also fabric covered.

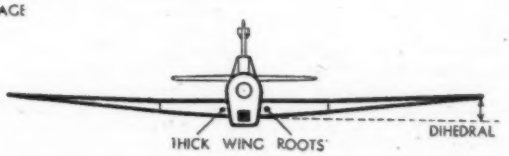
In general lines the Henley bears a strong family likeness to the Hurricane, but its wings taper and have dihedral straight from the roots instead of from a flat, rectangular centre-section. The large-area fin and rudder are to all intents and purposes identical with those of the Hurricane, but the tailplane is of somewhat higher aspect-ratio.









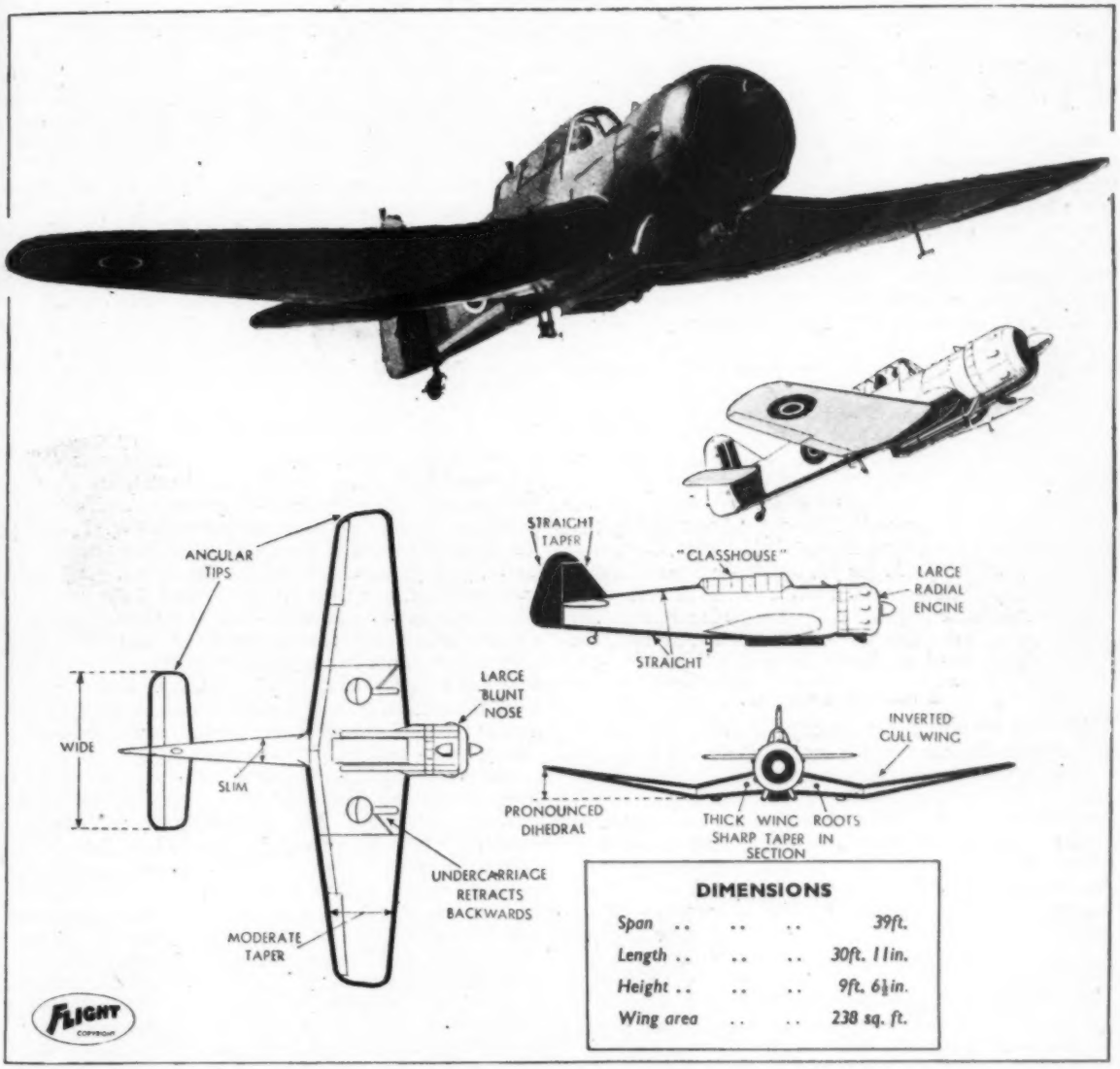


DIMENSIONS

Span	*47ft. 10½in.*
Length	*36ft. 5in.*
Height	*11ft. 9in.*
Wing area	*342 sq. ft.*

dheir Characteristics

MILES MARTINET



DIMENSIONS

Span	*39ft.*
Length	*30ft. 11in.*
Height	*9ft. 6½in.*
Wing area	*238 sq. ft.*

A DEVELOPMENT of the Miles Master II advanced single-engined trainer, the Miles Martinet was evolved especially for target-towing purposes and is now in regular service at a number of R.A.F. gunnery schools.

Constructionally, it follows the same general lines applied to all Master trainers, having a semi-monocoque fuselage built up in spruce, with stressed plywood skin, and wings also of wooden structure, a laminated plywood covering over which is laid an outer skin of fabric. Split trailing-edge flaps are fitted.

The Martinet differs chiefly from the Master II in having been strengthened structurally to cope with the added load imposed by drogue towing, but, like the latest Masters, its wing tips have been squared off. It employs the same inverted-gull type of wing formation, with very thick roots which taper sharply in section to the point where the anhedral gives place to dihedral at the junction of the outer panels and the centre-section.

A useful recognition feature of the Martinet is the shallow rectangular box beneath the centre-section of the fuselage (shown above) which houses the towing gear. This, incidentally, may be hydraulically, electrically, or wind-operated. Two long exhaust pipes from the back of the cowling run along each side of this box to carry the engine exhaust clear of the towing gear.

Powered by a Bristol Mercury XX nine-cylinder air-cooled radial engine of 830 h.p., the top speed of the Martinet unhampered by a drogue is 232 m.p.h. Its speed with target drogue in tow is, of course, rather less, and varies according to the type of drogue being used, as these differ in size and, therefore, in the degree of extra drag.

Notes from a Test Pilot's Diary.—No 12

High Flying

Importance of Physical Fitness : The Fear of "Passing Out" : Effects of Low Air Density on Controllability

By "WITNESS"

HEIGHT has the effect of decompression both on the pilot and on the engine. For years the engine has been helped to overcome the effect of diminished density at height by means of a supercharger, but only recently have we begun to take the equally logical step of supercharging the pilot so that he can get his cigar to draw almost as well at 20,000ft. as it did at ground level. The object of supercharging human beings, however, is not so much to enable them to enjoy undisturbed the better things of life as to make them function more efficiently and without too much fatigue.

With the unsealed type of cockpit, there is a need for additional oxygen, other than that available from the atmosphere, at any height above 15,000ft. if really accurate performance figures are to be taken. I must confess that there was a time when I used to go regularly to between 17,000 and 18,000ft. to do a M.P.A. level on a certain type of production aircraft, sometimes as often as seven or eight times in a day, without using an oxygen mask. The result I found very tiring physically, and towards the end of the day I knew my figures could not have been very accurate. However, there was no oxygen available, so the job had to be done without. On occasion I have also flown a level at just over 20,000ft. without oxygen, and even doing this at the beginning of the day, when I was fresh, resulted in figures which could not be guaranteed.

Bends at 40,000ft.

Wearing the normal Service oxygen mask, most people are reasonably comfortable up to 40,000ft., but here trouble is likely to be experienced with "bends" in one part of the body or other. This is due to trapped bubbles of nitrogen in the bloodstream being unable to escape sufficiently rapidly, and will usually make itself felt in an old wound or the vicinity of a recent bruise. The feeling, to my mind, is like a spasm of acute rheumatism, which no amount of rubbing or exercising of the affected limb will mitigate. "Bends" can be circumvented to a large extent by superoxygenating the pilot before flight. That is to say, he may either sleep in a suitable type of oxygen mask, with a supply equivalent to 30,000ft., or if it is impossible to make the rather elaborate arrangements necessary for that, he can take oxygen for 20 minutes to half a hour immediately before flight, preferably accompanied by sustained exercise. Such preparations will have the effect of making the blood more receptive to oxygen in flight.

As a general rule, 44,000ft. is considered the maximum safe height to which one can fly merely with an oxygen mask and without some form of pressurisation. Of course, it is possible to go higher and "get away with it," but the risk of passing out through anoxia (oxygen starvation) and going into an uncontrolled dive must be borne in mind.

Pressurised suits, such as the one worn by Adam when he obtained the world's height record for Britain, are bulky and not always possible to be accommodated in a small cockpit. The sealed and pressurised cockpit is the real answer for operation above the 40,000ft. level, and by this means it is practicable to maintain pressure on the bodies of the operating crew so that they only experience 30,000ft. conditions when flying at 45,000ft. or so.

Obviously one of the greatest anxieties when flying high is the thought of passing-out through anoxia, with the result that the aircraft may start to descend in an uncontrolled dive. Owing to the sinister machinations of a certain Herr Mach and his formula based on the reduced speed of sound at altitude (660 m.p.h. at 35,000ft. as compared with 760 m.p.h. at ground level), funny things happen when diving above 20,000ft., even in an aircraft which behaves quite normally in dives at the lower levels.

A Typical Report

This is the sort of thing which pilots report: "The dive was begun at 32,000ft. at a moderately steep angle. The aircraft rapidly became nose heavy, and attempts to flatten out resulted in severe tail-buffeting. Presently the elevators ceased to have any effect, and 'tramping' set in, first to port and then to starboard. Not until some 15,000ft. had been lost did control begin to return, and it was possible to flatten out at 7,000ft." Such is a typical result of increasing speed at altitude until compressibility effects began to mainfest themselves in line with the treacherous doctrine of that old Hun. Therefore, the effects of losing consciousness high up, even though the loss is of quite a temporary nature, may mean coming-to in rather trying circumstances.

The possibility of having to make an emergency parachute jump from any height above 25,000ft. makes the provision of a portable oxygen bottle an absolute necessity. It is not considered safe to bale out without portable oxygen at, say, 35,000ft., even if one is able to inhale enough oxygen to make climbing out and pulling the rip-cord possible, because unconsciousness may last for too long before the 20,000ft. level is reached, and, coupled with the extreme cold, this may prove fatal. Therefore, whether flying in a pressurised cabin or not, the pilot who operates above 25,000ft. should always see that the crew have portable oxygen bottles.

Lastly, a word concerning fitness, the wisdom of which is so obvious and yet sometimes overlooked. It is no good trying to fly high with a tummy-upset or sinus trouble. The first will lead to pain in the intestines long before the height for "bends" has been reached, and the latter to acute pain in the head during the descent. Diet is not given as much attention as it deserves. In the R.A.F., great strides have been made by the Flying M.O.s towards providing a well-balanced diet. But, although the general standard of feeding for civil test pilots in factories is good, the point has never been established that the nature of our work does justify No. 1 Priority in the matter of food. Directors can continue to direct successfully even when suffering from acute gout or indigestion, but the whole of the test pilot's work depends on his physical fitness.

The Bristol Giant

What, in Practice, the Published Figures Would Mean : Multiple Power Units and Undercarriages

WHILE it is extremely gratifying to find the daily Press taking such a keen interest in post-war British civil aviation, it is rather regrettable that premature, incomplete and to some extent inaccurate information should have been published by certain dailies. There may be good reasons for the Minister of Aircraft Production wishing to say nothing at present about the details of the four prototypes of aircraft which, as he annouunced in the House some time ago, have been entrusted to firms in the aircraft industry. They were selected on the recommendations of the Brabazon Committee, and in the short period that has lapsed since, it is scarcely possible that the plans of the firms can be very far advanced. Thus, although broad outlines may have been decided upon, there must necessarily be many details and data which are still tentative.

Such data as have been published concerning the type of aircraft on the design of which the Bristol Aeroplane Co., Ltd., is engaged have been largely speculative, and certainly unauthorised. That this is so is evident from the fact that the weight of the machine has been quoted as being anywhere between 100 tons and 200 tons. It has been suggested that passenger accommodation will be for 150 by day and for 70 or 75 when sleeping accommodation is required.

That such a project can scarcely be beyond the tentative stage emerges from an examination of what the figures really mean. Even at the lowest weight quoted, 100 tons, that means 224,000 lb. To get a fairly high cruising speed it is obvious that the wing loading will have to be high, which is merely another way of saying that the power loading must be fairly low to get off with a reasonable run. In any case, it will have to be moderate if cruising is to be done on the customary percentage of full power. A reasonable assumption for power loading would be 10 lb./h.p., based on take-off power.

Unless Mr. L. G. Frise, Bristol's chief aircraft designer, is contemplating jet propulsion, of which there has been no suggestion published, he must have based his design on power plants which are already in existence, or which may be assumed to have become available by the time the Bristol giant can be completed.

It seems reasonable to expect that a single-unit take-off power of 3,000 h.p. may by then be available. At a power loading of 10 lb./h.p. that would need more than seven units of 3,000 h.p. each, so that the logical deduction is that eight such units must be contemplated if the gross weight is 100 tons. At the 130 tons gross weight, which has also been mentioned, ten engines of 3,000 h.p. each would be needed.

Since it is scarcely likely that Mr. Frise would arrange his numerous engines in line abreast right across the wing span, it appears obvious that he must be contemplating some combination of engines into units. For instance, if eight engines were to be used, they could be grouped in four units of two engines each, a unit driving either a common airscrew or two contra-rotating airscrews.

Power plant installation is but one of many problems confronting the designer of an aircraft of such size. The undercarriage is one of the more obvious. The concentration of weight on two wheels (or even on three, if a tricycle is used) would be excessive, and a multiplicity of wheels would have to be adopted. These could be arranged as in the Me 323, an arrangement to which there are many objections, or they could be placed spanwise in line abreast.

The latter arrangement of undercarriage wheels suffers from the disadvantage that any unevenness of the airfield would impose fairly severe stresses on the wing structure, but in any case a giant aircraft would need a smooth runway so that this part of the problem might not be very serious. A burst tyre would set up local stresses in the wing, but these would probably be of less consequence than a burst tyre on an aircraft of such size if the orthodox type of undercarriage were used.

Our readers will appreciate that there is no official authorisation of the gross weight figures quoted. In fact, the Bristol company uses about the information published the expression "unauthorised and incorrect." We need hardly add that when official quarters decide that the information may be published, *Flight* will have it as a matter of course. All we have done is to show what sort of aircraft would result from loaded weights of 100 to 130 tons. They serve, we think, to show that a jump from the heaviest landplane in use to-day to a commercial machine of such weights gives rise to many problems, and that features at present untried will have to be introduced.

That is in no way intended as a criticism. On the contrary, the Bristol giant is part of a long-range policy, and if it is not to be out of date by the time it can be got into service it will have to make use of features about which at the moment little is known from experience, but which may reasonably be expected to have been tried out before actual construction has progressed very far.

THE GIBRALTAR AIR ACCIDENT

SHORTLY after taking off from Gibraltar on the night of July 4th-5th, a Liberator of the R.A.F. Transport Command, containing 11 passengers and a crew of six, crashed into the sea; the only survivor was the aircraft's Czech pilot.

The aircraft was bringing back to England General Sikorski, the Polish Prime Minister and Commander-in-Chief, who had been on a visit to the Middle East, and with him was his 28-year-old daughter, Mde. Zofja Lesniowska, who was Chief of the Polish Women's Services; Colonel Victor Cazalet, M.P., liaison officer to General Sikorski; Maj. Gen. Klimecki, Chief of the Polish General Staff; Col. Marecki, who was attached to the Polish General Staff in London; Lt. Ponikiewski, of the Polish Navy, who was A.D.C. to General Sikorski; M. Kuakowski, his private secretary; and Col. Gralewski.

Up to the time of going to press no precise information about the accident has been officially released for publication, other than that it happened soon after the Liberator had taken off during the hours of darkness and that the machine plunged into the sea, with the loss of all on board except the pilot.

The news reached London in a telegram to the Colonial Office from the Governor of Gibraltar, and the Polish ministers in London were at once informed, with the result that a Cabinet meeting was at once called at the Polish Government offices in Kensington Palace Gardens.

General Sikorski made his trip to the Middle East to inspect Polish troops in Syria, Egypt, Irak and Persia, and it was reported at the time that he made the trip against the advice of high Polish officers, who feared that some accident might befall him. It was his second visit to the Middle East during the war, for he was at Tobruk during the seige, and he had also flown to America twice and to Russia to confer with Stalin.

His daughter accompanied him in her capacity of Chief of the Polish Women's Services, with the special object of inspecting large numbers of Polish women who had recently arrived there from Russia. Her husband is a prisoner of war in Germany. General Sikorski's visit to the Middle East was said to have been in connection with the United Nations offensive.

Gas Turbines and Jet Propulsion for Aircraft

By G. GEOFFREY SMITH, M.B.E.

A second edition of the above booklet is now available from "Flight" publishing offices. The new work consists of ten chapters and includes many illustrations. Price 3/6 plus 3d. post.

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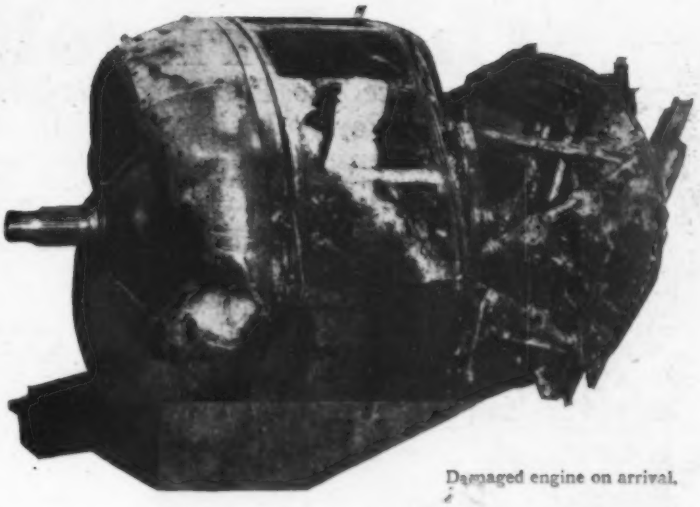
Action-damaged Aircraft Engines

How "Bristol" Power Units are Repaired



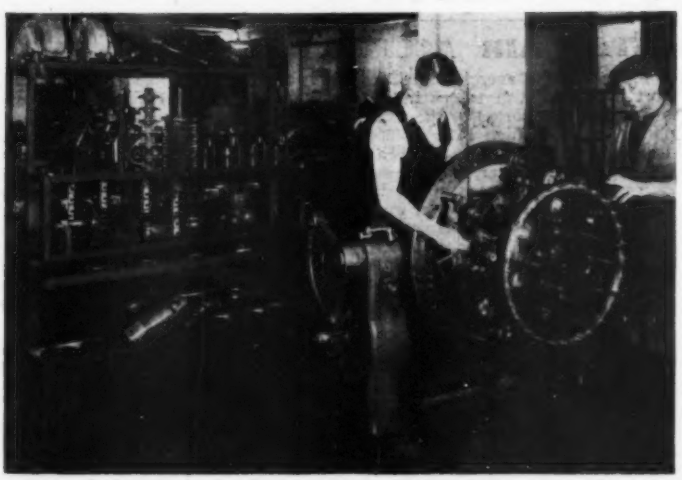
Damaged engine on arrival.

SOON after the outbreak of war the Bristol Aeroplane Company developed a series of establishments devoted to the repair of aircraft engines which were damaged either by enemy action or through such misfortunes as crash-landings. While by far the majority of engines which are dealt with are the sleeve-valve type, all the company's types come to these specialised works for repair, but it will simplify this article if one type only is dealt with, namely, the "Bristol" Hercules; the process is almost identical with every type.

The damaged engines arrive at the repair works and inspectors categorise them under three headings:

(1) Category B.—Repairable engines.
(2) Category E.—Engines considered to be damaged beyond repair, and to be reduced to produce spares.
(3) Investigation engines.—These are engines on which special investigation of some alleged failure has been requested either by the Air Ministry or the company's technical departments Such engines are removed to the "mortuary," where the "inquest" is held.

In the case of Category E, engines damaged beyond repair, what at first sight may appear to be a hopeless mass of crushed or burned metal, often covered with clay and turf, will give, when stripped down, a most varied selection of perfectly good components, particularly small items. These parts are, of course, subjected to the most rigorous acceptance tests and inspection before being passed to stores, and any suspicion of a defect or flaw is sufficient to warrant rejection.



Stripping—"Flying Fortress" stand in background.

This material was of the greatest value, particularly in the early part of the war when new production engines absorbed so much material. Indeed, so valuable is this work that there is a completely separate building devoted to Category E engines alone, the output being distributed to the various repair units throughout the country.

The Category "B" repairable engines for normal repair may be sub-divided into the following classes:

(a) Engines which have completed full life hours and are due for complete overhaul.
(b) Engines damaged or shock-loaded, due to aircraft crash or forced landings.
(c) Engine failures due to external troubles such as oil supply failure, foreign bodies entering the supercharger, etc.
(d) Incorporation of essential modifications.
(e) Enemy action.

When the damaged engine is received, it is removed from its wooden packing case, fitted to a steel waiting stand, and is checked-in, a note being made of engine type, serial numbers, accessories fitted, and deficiency of any major components, by the Inspection Department on the category sheet, which gives instructions as to the amount of stripping and cleaning required.

Stripping of Engine

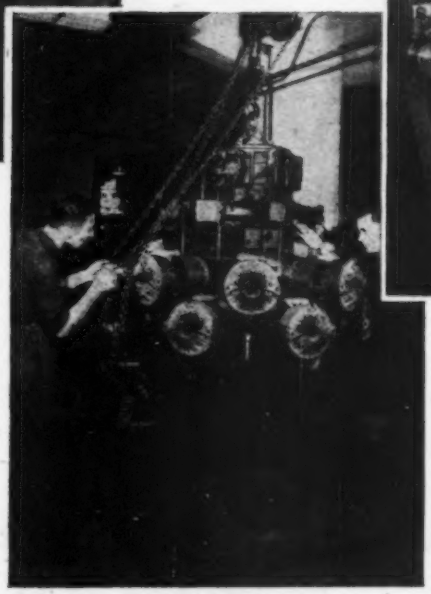
The degree of stripping depends on the amount of repair required and the previous history of the engine as given by its log book, and whilst most of the engines are 100 per cent. stripped, a few are stripped to the various sub-assemblies in order to rectify some minor damage.

The engine is mounted on a special stand capable of rotation, so that work may be carried out in any position. The sub-assemblies, such as reduction gears, superchargers, etc., are stripped separately but kept together with the remainder of the engine. The components are loaded on to special trolleys which, when empty, so bristle with rods and protrusions to take the various components that they have been christened in the shops "Flying Fortresses." Blanks and protectors are fitted to all components which are ground to fine limits and finish to avoid damage during the course of the engine through the shops.

Engines are stripped under the vigilant eye of an inspector, who issues a conditional report for digestion by the technical co-ordination of the repair side, for the benefit of the design office and other repair bases. The engine is next cleared for cleaning.

Engines which have had comparatively short runs, say up to 20 hours, and are free

(Top left) Cleansing pistons — Degreasing tank in background. (Top right) Examining for cracks with magnetic test. (Left) Micrometer test on sleeve. (Right) Sub-assembly— crankshaft building up. (Below) Sub-assembly —mounting the supercharger.



from heavy carbon deposits, are washed off in paraffin and then submitted for inspection. The majority of engines, however, have to go through a much longer degreasing or decarbonising process. Steel components are segregated from aluminium, and hoisted in baskets into the degreasing fluid contained in steel tanks and agitated with compressed air. On a badly carbonised engine aluminium components require approximately twice the immersion time necessary for steel, the most difficult part to decarbonise being the piston. Here shot blasting is used for the underside of the piston, with suitable blanks to protect the machined faces.

On removal from the degreasing tanks, components are given a stiff brushing to remove loose and softened carbon, and then washed in paraffin. Large parts, such as crankcases, superchargers, etc., are largely cleaned by hand, using mechanically operated brushes and mops. Engine cleaning is almost wholly carried out by female labour.

The highest possible standard of cleaning is maintained in order that subsequent inspection may be rigorously applied.

Inspection

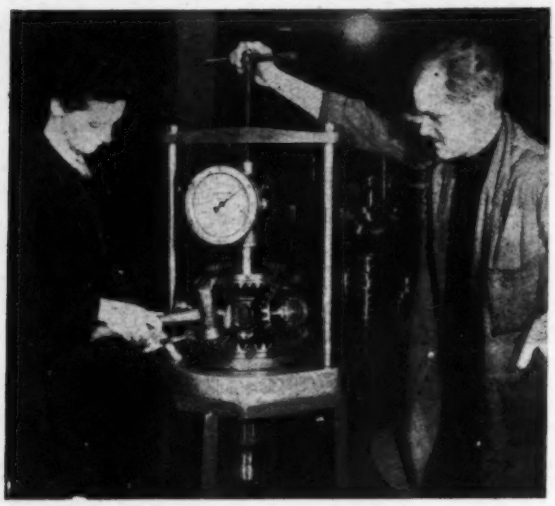
Prior to the normal bench inspection, aluminium components are subjected to an etching process for the detection of cracks and flaws, particularly around heavily stressed areas, such as gudgeon-pin bosses. Similarly, steel components are either "Magna Flux" or "Electroflux" tested for the detection of cracks.

The engine is then subjected to detail inspection. Alignment checks are carried out on parts liable to distortion, such as articulated rods. Dimensional checking is restricted to components liable to wear or distortion, such as cylinder sleeves, or where selective interference fits are required on reassembly, e.g., crankshaft centre bearing sleeves, fixed crankshaft sleeves, and some race locations.

Every component (even nuts and washers) is most carefully inspected, the smaller and simpler parts being inspected by female labour under male supervision. Details are recorded on standard report forms, which entail the minimum of writing. Details of rejects, on which further work is to be done or which are for complete scrap, are thus made obvious for covering any replacement required. The report form is divided into sheets which cover the various sub-assemblies of the engine, and follows them through the shops until the engine is finally rebuilt.

The engine and report are finally examined by skilled inspectors who add the necessary information for the modifications required. Finally, the absolute scrap is removed from the engine and the components requiring salvage operations are quarantined, suitably tallied, and despatched to another department, as redundant repairable material.

ACTION-DAMAGED AIRCRAFT ENGINES



Testing reduction gear on sub-assembly.

Progress

The progress department then stores the engine components in bins and issues those parts which require machining or polishing operations. They also arrange to requisition any material which was missing or rejected during inspection. As far as possible engines are rebuilt with original components, but assemblies are pooled when delay is likely to occur. Individual components such as articulated rods, crankcase sections and reduction gears are not interchanged. Complete sets of parts together with the appropriate report are then issued to the sub-assembly sections for rebuilding.

Sub-assembly

The various sections in this department, which operate as complete units and as far as possible work on the same engine together, are as follow:—

(1) Crankcase, including sleeve-driving mechanism;
(2) Front cover;
(3) Fitting of crankshaft for slip test and rebalancing if necessary;
(4) The fitting of crankshaft and master rod assembly to crankcase;
(5) Supercharger;
(6) Reduction gear;
(7) Cylinders;
(8) Sleeves and pistons;
(9) Rear cover assembly;
(10) Carburettor;
(11) Ignition harness;
(12) Magnetos

The main procedure in rebuilding these sub-assemblies is the same as for new engines, except that in most cases wider tolerances for fits and clearances are permissible on account of the wear that has taken place. Rebuilt engines are, of course, quite up to the standard of new production engines and are given exactly the same tests and life hours.

Throughout these operations numerous checks for clearances, end floats, tightening of locking devices, etc., are made and recorded by the inspector on the report sheet. In addition, continual watch is kept that all mating faces are thoroughly clean and free from damage, in order to ensure that all joints are oil-tight. One of the major fitting problems of the modern aircraft engine is to ensure that oil reaches positions where it is required, and does not leak from the multitude of joint faces. This is of particular importance on engines under repair, where the joint faces have been made previously and are not so easy to re-bed as when newly machined.

Supercharger two-speed clutch units are pressure-tested with hot oil to ensure their correct functioning.

The complete rear cover unit is given a rig test at slow and high speeds, and an endurance run, to ensure that the pressure and scavenge oil pumps give the required pressure and the specified deliveries of oil. The functioning of the petrol pump is also checked and the "high initial oil pressure" valve is tested with cold oil.

The reduction gear is pressure-tested at various stages during assembly, a special inspection point being to check the backlash of bevel pinion gears, with a load of 3,500 lb. applied to the rear thrust race, to stimulate the thrust conditions experienced in flight.

A particularly important point with pistons is fitting rings of the correct type, with the lands the right way up. In the majority of cases new rings are used in order to maintain normal oil consumptions. The accessories, including the carburettor, magneto and ignition harness, though not manufactured by the Bristol company, are also thoroughly overhauled.

Three categories of overhaul are used for carburettors, depending on their previous history. They include splitting the body for examination of internal components; partial overhaul to the extent of removing various units for examination, and complete strip.

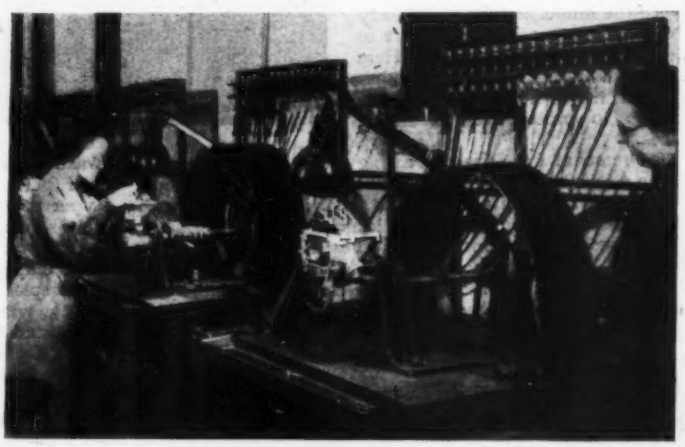
Completed carburettors are subject to tests to ensure that the altitude control operates at the correct angular opening of the throttle and also for operation of the boost control.

The Bristol Aeroplane Company has developed a special highly skilled section of their repair organisation to deal with magnetos. Magnetos are first of all stripped down and rebuilt with any new parts required. They are then given an endurance run, sparking across ball gaps at voltages approximately 50 per cent. in excess of sparking plug requirements. Especial care is taken with the functioning and adjustment of contact breaker mechanisms.

The ignition harness is completely stripped down and usually rewired with new high-tension cable. It is then given high-voltage insulation and continuity tests.

Engine Erection

The final stage in the repair of an engine is, of course, the erection. The various completed sub-assemblies and units are all fed to a central pool adjacent to the engine erection section, and are carefully blanked and protected



Magnetos under test—rows of spark gaps can be seen above and behind.

ACTION-DAMAGED AIRCRAFT ENGINES

to prevent ingress of foreign bodies during time in store.

Throughout the engine erection operations, inspection checks are made, the simpler operations being performed by female labour. After final inspection and checking of the report, to ensure that all necessary modifications have been incorporated, the engine is sent for test.

Preparing for Despatch

On satisfactory completion of tests, the engine is inhibited internally to prevent any possible corrosion whilst in store, and a thorough final inspection is made to ensure that no defects have developed during test. Checks are made that all locking devices are in position, and the engine is then delivered to the packing department, where it is secured in a substantial wooden stand and packing case, ready for despatch.

It is an interesting feature of the B.A.C. repair depots that about 50 per cent. of the total labour employed is female, so that a comparatively small number of trained and experienced men from the Bristol Aero Engine Division was required when the work was first started in 1940.

A Bristol repaired aircraft engine has an expectation of life equal to that of a new one, so that it may be seen what an important contribution has been made by the company's repair department to the demands of the nation's air arm.

Despatch of a repaired engine.

Book Reviews

"Aero-Engine Theory"—A Fitter's Course, by D. R. W. Archer, B.Sc., and A. C. Ree, B.Sc. Sir Isaac Pitman and Sons, Ltd. 10s. 6d.

THE authors' endeavour to point out the inflexible relationship between cause and effect everywhere in this book has been achieved. An unusual but interesting feature is an elementary treatise of the atomic theory which should materially assist the reader in mastering the theory of electricity and magnetism that follows. Modern and easily understood, with numerous diagrams and illustrations, this book will be most helpful to fitters in the Services and industry alike.

"Testing of Aero-Engines," by R. A. Beaumont, A.F.R.Ae.S. Sir Isaac Pitman and Sons, Ltd. 7s. 6d. net.

FEW engineers have the opportunity to acquire experience in the testing of aircraft engines, consequently this book should prove to be most interesting to ground engineers and students alike who desire detailed and accurate information of the general principles governing this branch of aircraft engineering. Six excellent chapters of practical information and data presented in a manner which even the test-house engineer will fully appreciate and find most useful.

"Engineering Inspection" (Second Edition), by A. C. Parkinson. Sir Isaac Pitman and Sons, Ltd. 6s.

REVISED and extended since the first edition appeared in 1940, this book provides clear information on the meanings of limits and tolerances, modern materials, with special emphasis on aircraft materials, heat-treatment, hardness testing, measuring and gauging methods and devices, etc., etc. A book of practical information and fundamental technical guidance which the inspector, viewer or examiner will find of inestimable value in these days of intensified production to close limits and interchangeability.

"Flight and Airframes for the Aircraft Fitter," by D. O. Bishop, B.Sc., and P. A. Bosanquet, B.Sc. Sir Isaac Pitman and Sons, Ltd. 10s. 6d.

WITH the paper shortage problem becoming acute any addition to the numerous existing elementary text-books on this subject appears unwarranted, but the publication of "Flight and Airframes" is certainly justified, due to its numerous original features and less conventional but generally superior descriptions, aided by a collection of excellent diagrams and illustrations. For the many who wish to become interested in aircraft engineering, or desire to improve their knowledge in that direction, this will be found an ideal text-book, incorporating modern methods of aircraft engineering with a section on hydraulics, also blueprint reading for the fitter. Wood and plastics, however, have been treated lightly, and one regrets that this promising combination and laminated plastics have not received more attention in an otherwise up-to-date text-book.

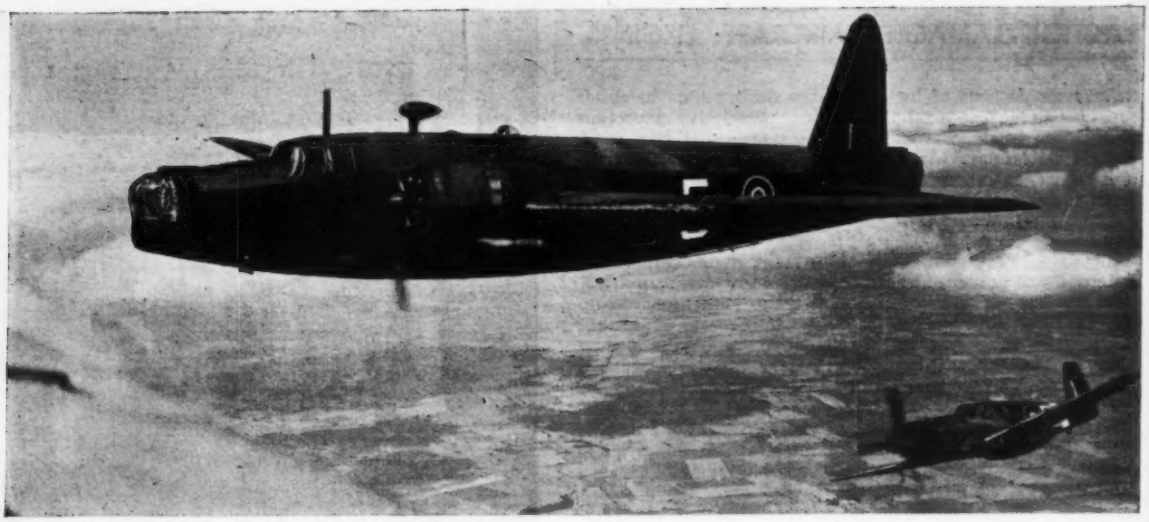
Tattered Battlements: a Malta Diary. By a Fighter Pilot. Peter Davies. 7s. 6d. net.

THIS slim little book of 134 pages does not look from the outside as if it were worth three half-crowns, but it is. The defence of Malta is one of the epics of the war, a miracle if ever there was one. Every intelligent person wants, or ought to want, to know something about how it was done, and a fighter pilot with a distinct gift for handling a pen is the proper person to tell one something about it all. This author does tell one a good deal, but the success of the defence remains a miracle and a mystery all the same. The author was in the island during its worst time, March and April, 1942, when raids were incessant by day and night. A raid would consist of some 80 or more Axis bombers and fighters, and frequently the island could only send up four Hurricanes and four Spitfires to meet them. The odds were fantastic. The defence was very proud when one day it was able to send up 15 fighters all at once. On the island all the fighters were pooled, and no pilot was able to keep one machine for himself, for there were about three pilots for every machine. It had to be recognised that the loss of a pilot would be less serious than the loss of an aircraft.

The various airfields were repeatedly bombed, and the Spitfires and Hurricanes were always landing amid the new craters. Constantly machines on the ground were damaged by bomb splinters, and sometimes they were completely destroyed. The ground crews must have had a fearful time. Yet this tiny force took terrific toll of the raiders, with small losses of British pilots.

The author is a thinker as well as a man of action. He constantly discusses life and death, courage and fear, and kindred subjects. He concludes that the ground gunners were the bravest men on the island, as they had the most trying and terrifying job. To the courage of the Maltese people he pays a high and obviously sincere tribute.

There is much more which might be written about this very interesting book, but space is limited, and we can only recommend our readers to get it for themselves.



Tactical exercises for pilots and gunners of a bomber when attacked by fighters. The machines in this case are, of course, a Wellington and a Mustang.

School for Super-gunners

Accent on Marksmanship at the C.G.S. . Exchange of Experience in Developing Instructional Technique : "Flight" Takes Part in "Evasive Action"

A SHORT while ago *Flight* described the activities of an R.A.F. Flying Training Command school for air-gunners where recruits are taught, *ab initio*, the job of shooting down the enemy. Last week-end we visited a very different kind of school for air-gunners, namely, the Central Gunnery School under the Command of Group Capt. C. E. Beamish, D.F.C.

The essential difference at this school is that the courses it provides are taken by selected gunners from operational squadrons and by fighter pilots who have already been in combat. In fact, it was observed that not only instructors but a good many of the pupils wear decorations, and a lot is learnt from the more experienced of them so that the course is virtually an exchange of experience which has the great advantage of keeping everyone up to date.

The school exists primarily to set the highest possible standard for gunnery in the R.A.F. and to develop the technique of air gunnery instruction.

It operates in two wings, the gunnery Leaders' Wing and the Pilot Gunnery Instructors' Wing. The former trains air gunners and wireless operator/air gunners in leadership, and on leaving the school they are qualified to take charge of all aspects of gunnery training in their squadrons or training units. The other wing trains selected pilots as air-firing instructors who are then posted to operational squadrons or training units, where they will be responsible for training pilots in all phases of fixed gunnery.

A particular feature of this C.G.S. is that while each of the two wings works to its own syllabus, they also take part in joint exercises in the air. The major part of the school's training is done in the air, since the emphasis is on marksmanship, but ground instruction has its part in the course and employs a number of extremely ingenious synthetic devices—all designed to improve marksmanship — which, however, may not be described.

The Pilot Gunnery Instructors' Wing (or Fighter Wing, as it is more

EX CATHEDRA: Four famous fighter pilots who make available all their accumulated experience to the school. Left to right : Sqn. Ldr. R. C. Dafforn, D.F.C. ; Group Capt. C. E. St. L. Beamish, D.F.C. ; Wing Cdr. R. G. R. Walker, D.S.O., D.F.C. ; and F/O. (Screwball) Beurling, D.S.O., D.F.C., D.F.M. and Bar.

usually called on the station) has three flights to perform different exercises. First, there is the Fighter Combat Flight in which Spitfire exercises against Spitfire with camera guns. Secondly, there is the Bomber Combat Flight which takes part in the joint exercises with the Wellingtons of the Gunnery Leaders' Wing, and finally, there is the Air Firing Flight, which uses drogues. Spitfires are mainly used in this wing, but when dual instruction is required in combat and air firing, Miles Masters are used.

Pilots and gunners from all the Dominions are to be found at the C.G.S., and also a sprinkling of Polish and other Allied airmen, while a fair number of Americans have also taken the course from time to time.

Since both pupils and instructors may be fairly said to be drawn from the cream of the R.A.F.'s marksmen, they include a number of men who have become celebrities and, at the time of *Flight's* visit, F/O. Beurling, the Canadian "ace" fighter pilot who already has 27 enemy aircraft to his credit, was taking the course. Beurling's marksmanship, incidentally, is not restricted to air fighting, for we saw him knocking down clay pigeons with astonishing regularity by way of a little gentle relaxation. Though not actually part of the course itself, clay-pigeon shooting is provided since the sport obviously helps towards the development of the School's main objective—marksmanship.

Scope of School

Air exercises are not carried out over the station itself, of course, but on ranges some miles distant in a more suitable locality.

Not that the station is a particularly large one. In point of fact, the calls upon its accommodation and equipment keep it very much operating to capacity, and the various Commands, whose gunners and pilots it receives, each have a definite allocation and, in some cases, have to bring their own aircraft to augment the School's Spitfires; a number of Army Co-operation Command Mustangs, for example, were to be seen, while the presence of at least one Barracuda reminded us that the C.G.S. places its services at the disposal of Fleet Air Arm personnel also.

A careful check is naturally kept on the progress made by pupils. Scores recorded on shoots are plotted on a graph for each pupil, and it was noticed that while the general tendency was commendably upwards, every graph comprised a series of peaks and valleys. This, it was explained, was because every man's markmanship is affected by a number of conditioning factors. Gun-sights may sometimes be slightly "off" without the gunner or pilot being aware of it; weather obviously affects the degree of accuracy any given marksman can achieve, while the man's own mood also has a very real effect. Due allowance is always made for these extraneous influences when assessing progress.

An interesting sidelight on the method of scoring after a drogue shoot may be outlined without disclosing exact details. It is that the drogue, as representing an enemy aircraft, is divided into three sections, a, b and c, from front to back. Hits in the "a" section, being equivalent to hits on the engines or cockpit of an aircraft, count more than on section "b," which again counts more than section "c"—when one recalls the tattered tail-units and perforated afterparts of some of our aircraft which have, nevertheless, returned safely to their bases, the low score-value of hits in section "c" is fully appreciated. The actual score, then, is worked out by a special formula based on this principle.

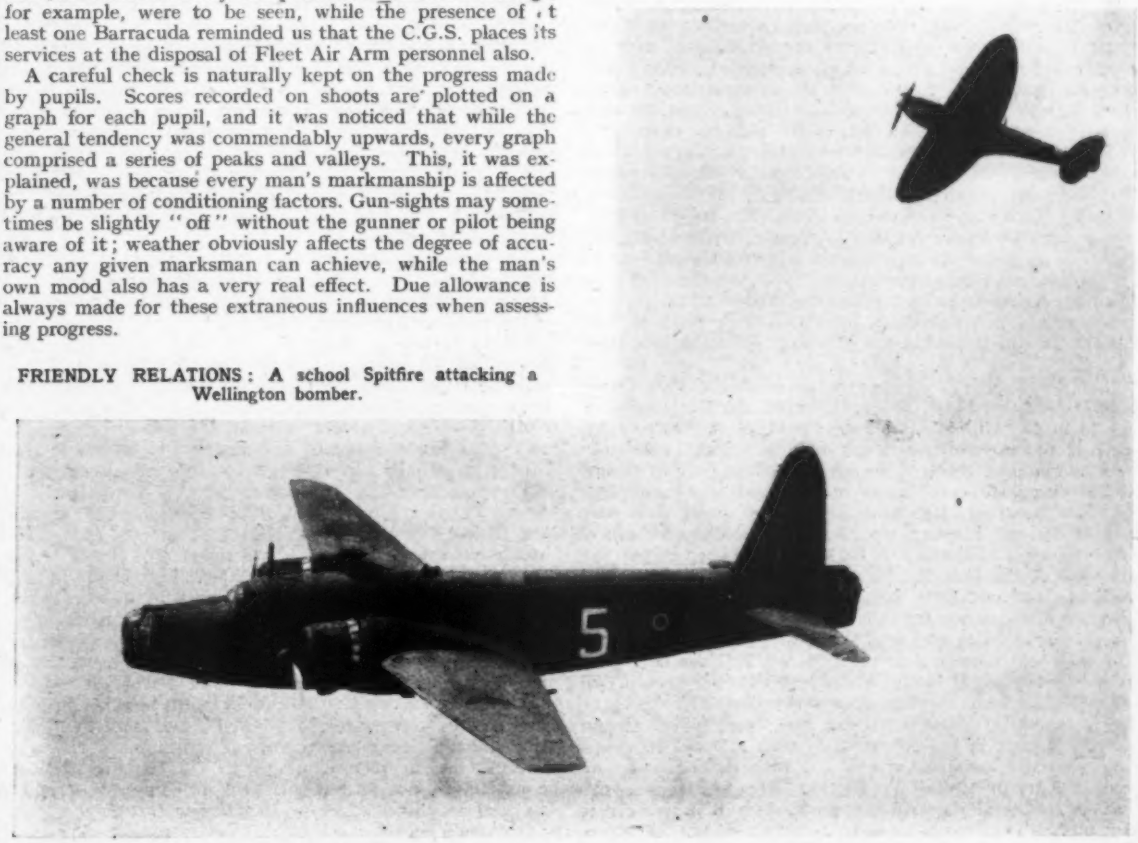
Keeping Up-to-date

Aircraft exercising on the ranges keep in R/T communication with the station, and the progress and completion of every shoot is marked up on a blackboard outside the control office. By this means waiting pupils and instructors can see at any time how long it will be before their turn comes to take-off, which enables them to put their spare time to best advantage.

It may incidentally be mentioned here that instructors at the C.G.S. are changed frequently. This is partly because fresh men bring with them up-to-date experience and partly because the school would never get the best instructors if they feared they would be held permanently; neither gunners nor pilots enjoy being kept away from operational flying for very long.

Flight was able to sample at first-hand the type of exercise indulged in by the "combined operations" of the two separate wings, and went up in a Wellington for a mock fight with a Spitfire.

The cloudbase was none too high, so the scrap took place much nearer the ground than that at which genuine "parties" are usually held. However, aerial excitement is in inverse ratio to altitude! Having climbed to "X"



FRIENDLY RELATIONS: A school Spitfire attacking a Wellington bomber.

SCHOOL FOR SUPER-GUNNERS

feet, the "enemy fighter" soon entered the arena and word was given to "let battle commence." Our Wellington's exercise in this instance was not air gunnery, but evasive action, and the young Canadian pilot officer at the controls warned us to keep our inter-com. plugged in so that we should know when to hold tight.

The control officer, head in astrodrome, announced the presence of the "enemy" on a parallel course and about 600 yards distant to starboard. Visibility was only moderate.

"He's climbing," said the control officer's voice on the inter-com., "now he's beginning to turn to port—he's coming in to attack; here he comes!"—the voice rising in the best John Snagg tradition.

"Here we go!" sang out the Canadian pilot, twisting the "spectacles" through 90 degrees and shoving the column forward. The Wimpey heeled over to port, stood on its wing-tip, and then plunged earthwards. Our stomach, a bit beyond the age-limit for R.A.F. aircrew, nevertheless coped tolerably well with this sudden application of "negative G." Our "mike," however, ceased to dangle on its cord, and floated up like Charlie Chaplin's celebrated watch as though beseeching us to say a few appropriate words to the pilot. The landscape rapidly approached, slantwise (much nearer than timid folk like ourselves regard as comfortable), but Johnny Canuck knew his stuff and eased the column back, reversing the bank, to send the Wimpey up in a steep climbing turn. "G" now became emphatically positive, and *Flight* felt as though it had swapped torsos with Teddy Brown. Quite incidentally (to us!) the "enemy" had broken away astern and we next saw him high on our port bow. This time butterflies fluttered desperately in *Flight's* tummy again, but the Spit flashed impotently beneath us.

Again and again the Spitfire attacked, his every move instantly reported by the control officer, while the young Canadian threw his bomber about the sky with astonishing alacrity. It went on for almost exactly 30 minutes, so that, great as was our admiration for both pilot and aircraft, the increasing likelihood of wasting the first-rate lunch so recently enjoyed in the mess made us welcome the pilot's intimation that the little show was over.

A mischievously grinning maintenance crew had informed us, just before the take-off, that leaving one's rations behind in their aircraft involved a fine of "half-a-dollar." *Flight* is proud to record that no such obligation was, in fact, incurred—but admits that another ten minutes of "evasive action," as the C.G.S. translates it, would most likely have produced beer money for the Erks! It appears we are not quite as young as we used to be!

Two-way Lend-lease

"What's Mine is Yours," is the R.A.F. Attitude Towards the U.S.A.A.F

THIS is not merely a pleasant-sounding slogan emphasising the ever-growing camaraderie between the R.A.F. and the American air forces. It is the spirit in which the R.A.F. has carried out its part in reverse Lend-Lease. There is ample evidence of the great practical assistance in the way of equipment of every kind which has been and still is being given by the R.A.F. to our American ally. As the power of the U.S.A.A.F. steadily builds up in Britain, so the resources and experience of the R.A.F. are placed at their disposal. The essential requirements of the U.S.A.A.F., airfields to house them and provisions to feed them, are given free. There are also many additional services with which the R.A.F. can help. It provides them with many items of equipment and even aircraft to save shipping space, throws open special courses of instruction, and lends personnel to help them settle down in the different operational conditions of the offensive base which England has now become.

The Air Ministry, in co-operation with the War Office and Ministry of Food, has agreed that the United States forces in the United Kingdom should be provisioned by British procurement agencies, and that local purchases will be made by the U.S. forces themselves only in exceptional circumstances. Some of the food to be supplied includes potatoes, jam and marmalade, fresh fruit and vegetables, sugar, syrup, tea, chocolate, candy and cookies. The resources of the N.A.A.F.I. have also been put at the disposal of the U.S. forces. It is believed that the total tonnage of foodstuffs supplied will come to between 200,000 and 250,000 tons during 1943.

All the airfields and depots necessary to accommodate the men and machines of the U.S.A.A.F. have been provided by the Air Ministry, and wherever it has been necessary to augment existing accommodation, airfields have been especially constructed for their use. Two of the largest depots in the world have been allotted to them, one specially constructed and the other relinquished by the Ministry of Aircraft Production. Headquarters for the U.S.A.A.F. and its various commands and a rest centre for officers from operational units have similarly been provided at Air Ministry expense. In addition, full liability has been accepted for the repair of all damage to property placed at the disposal of the U.S. forces.

American Air Force personnel are receiving instruction side by side with the R.A.F. personnel at a variety of courses organised by the R.A.F. These include flying control duties, night fighter courses, beam approach training, and oxygen courses. Vacancies at the Empire Central Flying School have been offered to U.S. Army and Navy officers, and U.S. personnel are already undergoing instruction at the works of civilian contractors, side by side with R.A.F. personnel. All such instruction is afforded as reciprocal aid.

The American task forces were supplied by the R.A.F. with most of their radiolocation equipment for the North African campaign, including many stations and experienced personnel to operate them.

Up to March 31, 1943, 675 aircraft, including a large proportion of Spitfires, as well as communication and training types, have been supplied to the U.S. forces. A large number of these was issued to the U.S.A.A.F. in North-West Africa, along with all the necessary maintenance items, such as engine and airscrew tools, and aircraft concealment parts. A very considerable amount of fighter R/T equipment was provided to the U.S.A.A.F. in North Africa at the urgent request of General Spaatz throughout the period October to April last. This was carried out at the expense of the immediate reserves of R.A.F. units.

For the winter of 1943-4, plans have been made to meet American requirements for such things as de-icing paste, de-frosting fluid, and propeller de-icing paste. 3,500 dinghies are being supplied, and a proposal that the R.A.F. should supply the U.S. forces with equipment for 38 mobile workshops is at present under discussion.

Until the necessary additional staff has reached the U.S.A.A.F. from America, R.A.F. and W.A.A.F. personnel have been lent in various capacities.

Examples of reciprocal aid in this country, though conspicuous, do not complete the picture. We continue to send assistance direct to America in the shape of both personnel and supplies.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SAILPLANE EFFICIENCY

High Lift and High Resistance

IT is refreshing to see Mr. J. R. Lawson boldly introducing a branch of flying which is not (and I hope never will be) of the slightest military or commercial value, namely, sailplaning. Though I cannot give the expert opinion he desires, his 400 lb., if empty, weight seems high, unless he is using unusual load factors. The very low landing speed is doubtless to be obtained by means of high-lift devices, which would partly account for the weight. In general, the performance is good for a machine of that size and weight, as far as can be judged, but is a long way from being the best obtainable from *any* sailplane. More details are really needed.

W. E. HICK.

ENGINEERS AND SERVICE MEN

Wasting Man-power

REFERRING to J. H.'s letter in *Flight* of June 24th, in which he says that the fighting man is still at the very least as important as the engineer. In this, I must agree, where it is applied to the early part of this war and to previous wars, because the importance of engineering has not been fully appreciated. Even now, there must be numerous occasions where courage and bravery are the essential qualities in winning battles. But, on the whole, modern mechanical warfare is finding far less use for these time-honoured qualities.

Consider, for instance, a bomber pilot faced with an overwhelming force of fighters on his way to an objective. A brave man would go on and take the probably inevitable risk of (a) losing his machine and the man-hours it took to build; (b) failing in any case to reach his objective, and (c) losing his life and the lives of his crew. The quality called for here is a strongly developed instinct of self-preservation, which might be labelled cowardice or common sense. In my opinion, it is the latter.

Consider now the essential qualities of a modern Service man such as an air pilot, he being the user of a more modern form of fighting tool. His scope of operations is strictly limited to what his machine will do. He must be proficient at exploiting what mechanical advantages, such as speed, ceiling, range, fire power, etc., his machine has over his enemy. He becomes, in effect, the servant of the tool, rather than the tool being his servant; and the qualities that best equip him for the job are an engineering knowledge.

Just as in modern industry, machines do the work and operators serve the machines; so in modern war the soldier and airman are becoming the servants of the tools they fight with, and their whole training should be (and I hope is) directed to that purpose. Success or failure in battle is becoming more and more dependent on the quality of the tools he fights with.

When Hitler has lost this war I predict that historians will find that the chief cause of the German collapse will be his failure to appreciate until too late the importance of engineering. He, like our "brass hats," has been brought up with the old-fashioned military mentality, and it has made him pull too many engineers into the Forces like our Ministry of Labour seems to be doing, so that the quality of the tools they fight with has suffered. And nothing will reduce the moral of fighting men more than to know they are going into battle serving inferior tools! Hitler's only hope now, if he realises his mistake, is that our "brass hats" will continue to think the Forces more important than their tools and let the tools suffer in consequence.

There are perhaps few engineering firms who have not suffered from their employees being called up and replaced by women, or by C3 men, who are becoming conspicuous by their absenteeism. There are also no doubt numerous examples of qualified engineers in the Forces who would be better employed in the factories; one such man I know (he has an engineering training and eight years' factory experience in posts worth up to £800 per year), who is now a private in the Army. Surely, it is time that the much-advertised Ministry of Labour Appointments Board worked properly and prevented such waste, and also time that the Forces released their man-wasting grip on engineers who could be better used in industry.

Might I suggest, for instance, that grounded pilots and air crews be given the option of going into the aircraft industry where their experience would be useful, instead of going into the Army as privates, as some of them do.

R. D. LEAKEY.

IGNITION TESTING

Different Aspects of a Controversial Subject

THE question of ignition testing, whether on the ground or in the air, is always apt to produce controversy especially amongst the engine experts. The pilot wants to make sure that both ignition systems are doing their stuff, but the engine maker does not want any test to be carried out which may strain an already overburdened ignition apparatus to bursting point.

Originally, dual ignition was laid down as a *sine qua non* for aircraft engines purely on the score of reliability, so that if a defect occurred in one set of magnetos, leads or plugs the other set could keep the engine going comfortably. In the course of development, boost and M.E.P.s have risen to the point where, if one plug is cut out at max. power, the resultant single ignition may cause detonation. It is therefore all the more essential for the test pilot to ascertain, before passing a machine out, that both ignition systems are absolutely free from defects, but I entirely agree with your correspondent in advising that single ignition checks should be as short as possible. Moreover, except when the engine is being tested in the air for the first time, or some adjustment has been carried out to the ignition, there is a strong case for advising pilots not to earth magnetos at full power as a general rule.

On the other hand, the need for a single ignition check at moderate power every time the engine is restarted seems justified, particularly in the case of radial engines. With this type the chance of a carbon particle being washed into one of the plugs of the lower cylinders so as to cause a short, whilst the engine is standing, is considerable. At any rate, I have had reason to regret not checking the switches at zero boost after a restart and finding myself airborne with an engine shaking like a jelly through a fouled plug!

"WITNESS."

THE MESSERSCHMITT Me 323

FURTHER details are now available of the Messerschmitt Me. 323. This aircraft is a high-wing six-engined transport with a span of 181 ft. and a length of 93 ft. 4 in. It was developed from the Me. 321 glider and has, in fact, almost an identical airframe. The engines are Gnome-Rhone 14 N 14-cylinder, two-row, air-cooled radials of 965 h.p. at 13,200 ft., which give it a maximum speed of approximately 170 m.p.h. at sea level.

The normal crew consists of two pilots, a radio operator and two engineers. The pilots' cockpit is forward of the leading edge and is heavily armoured. The radio operator's cabin is actually inside the main spar of the wing on the port side. In the leading edge of the wing on each side of the fuselage there is a cabin from which the engineers control the three port and starboard engines respectively.

Up to eighteen 7.9 mm. machine guns can be mounted in various positions in the aircraft.

Access to the main loading space, which measures 20 ft. long by 9 ft. wide by 11 ft. high, is through the nose of the fuselage, which is split to form two vertical doors 11 ft. high. Aft there is another loading space measuring 19 ft. long by 9 ft. wide with access through doors in the side of the fuselage. It is reported that a 3-ton lorry, a light tank, or as many as 100 troops can be carried.

The undercarriage is composed of six rear main wheels and four smaller front wheels housed in fairings along each side of the fuselage.

Cheapness of production seems to be the main feature of manufacture, as the aircraft is constructed mainly of steel tubes, plywood and is fabric covered.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

A.T.C. cadets of No. 1889 squadron emplaning on an Airspeed Horsa during a recent visit to a glider station.

Promotions

R.A.F.

GENERAL DUTIES BRANCH.

Air Marshal (temp. Air Chief Marshal) Sir C. L. COURTNEY, K.C.B., C.B.E., D.S.O., to be Air Chief Marshal. June 1st, 1943.

Air Vice-Marshals (Act. Air Marshals) to be Air Marshals (temp.). June 1st, 1943:—

Sir P. R. M. DRUMMOND, K.C.B., D.S.O., O.B.E., M.C.

Sir J. C. SLESSOR, K.C.B., D.S.O., M.C.

Air Commodores (Act. Air Vice-Marshals) to be Air Vice-Marshals (temp.). June 1st, 1943:—

W. F. MacN. FOSTER, C.B., C.B.E., D.S.O., D.F.C. (ret.).

G. R. BROMET C.B., C.B.E., D.S.O. (ret.).

R. L. G. MARIX, C.B., D.S.O.

R. B. MANSELL, C.B.E.

M. B. FREW, C.B., D.S.O., M.C., A.F.C.

Air Comdre. R. V. GODDARD, C.B., C.B.E., to be Act. Air Vice-Marshal, March 3rd, 1943, and Air Vice-Marshal (temp.). June 1st, 1943.

Group Captains to be Air Commodores (temp.). June 1st, 1943:—

A. GRAY, M.C.

J. P. COLEMAN, A.F.C.

O. R. GAYFORD, C.B.E., D.F.C., A.F.C.

K. B. LLOYD, C.B.E., A.F.C.

A. R. CHURCHMAN, D.F.C. (Seny. November 1st, 1942.)

S. C. STRAFFORD, C.B.E., D.F.C.

D. L. BLACKFORD (Seny. November 1st, 1942.)

A. P. DAVIDSON, C.B.E.

A. L. A. PERRY-KEENE, O.B.E.

W. A. B. BOWEN-BUSCARLET, C.B.E., D.F.C.

F. J. FOGARTY, D.F.C., A.F.C.

S. E. STORRAR.

S. D. MACDONALD, D.F.C.

T. M. WILLIAMS, O.B.E., M.C., D.F.C. (Act. Air Vice-Marshal)

V. E. GROOM, O.B.E., D.F.C.

J. A. GRAY, C.B.E., D.F.C., G.M.

E. J. KINGSTON-MCCLOUGHRY, C.B.E., D.S.O., D.F.C.

W. E. G. MANN, C.B.E., D.F.C.

T. C. TRAILL, O.B.E., D.F.C.

J. D. BREAKEY, D.F.C. (Act. Air Vice-Marshal).

R. IVELAW-CHAPMAN, C.B.E., D.F.C., A.F.C.

L. DARVALL, M.C.

TECHNICAL BRANCH

Air Commodores (Act. Air Vice-Marshals) to be Air Vice-Marshals (temp.). June 1st, 1943:—

O. G. W. G. LYWOOD, C.B.E.

R. S. AITKEN, C.B.E., M.C., A.F.C.

Group Captains to be Air Commodores (temp.). June 1st, 1943:—

R. O. JONES, A.F.C. (Act Air Vice-Marshal).

J. R. CASSIDY.

W. F. THEAK.

A. F. LANG, M.B.E., A.F.C.

C. P. BROWN, C.B.E., D.F.C.

EQUIPMENT BRANCH.

Group Captains to be Air Commodores (temp.). June 1st, 1943:—

T. FAWDRY, O.B.E.

A. GARRITY, C.B.E.

T. G. BOWLER.

ACCOUNTANT BRANCH.

Group Captains to be Air Commodores (temp.):—

J. RYLANDS, C.B.E. September 7th, 1942.

H. G. JONES, C.B.E. June 1st, 1943.

R.A.F.V.R.

ADMINISTRATIVE AND SPECIAL DUTIES BRANCH.

Group Capt. A. C. CRITCHLEY, C.M.G., C.B.E., D.S.O., to be Air Commodore (temp.). June 1st, 1943.

H.M. the King and Mr. Winston Churchill in the officers' mess of the air station at which the King landed when he flew back from North Africa. He is still wearing his flying boots

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Bar to Distinguished Service Order

Act. Wing Cdr. P. R. BEARE, D.S.O., D.F.C., No. 70 Sqn.—This officer has commanded the squadron for three months, and during that time has displayed the utmost energy, determination and force of character. Wing Cdr. Beare is an outstanding leader and a fine operational captain. On a recent occasion he was successful in bombing a road along which the enemy was attempting to retreat, effectively blocking it, and causing much confusion and disorganisation.

Distinguished Service Order

Wing Cdr. J. R. LEGGATE, No. 53 Sqn.—This officer commanded No. 53 Sqn. from February, 1942, till February, 1943. During that period the unit took part in operations against enemy shipping in the North Sea, the Bay of Biscay and over the Atlantic. Between August and November, 1942, 18 submarines were sighted and 15 of these were attacked. Wing Cdr. Leggate has completed 81 sorties and was responsible for two attacks on U-boats.

Act. Wing Cdr. H. A. CLARK, D.F.C., No. 37 Sqn.—During a period of intense air fighting in April, 1943, this officer's tireless efforts were reflected in the fine work accomplished by the squadron. In addition to his work on the ground, Wing Cdr. Clark took part in numerous sorties in Tripolitania and Tunisia, all of which were brilliantly executed.

Act. Wing Cdr. J. F. ROULSTON, D.F.C., No. 55 Sqn.—In April, 1943, he flew the leading aircraft of a formation detailed to attack the airfield at Soliman. When nearing the target, the windscreen of his aircraft was shattered by splinters from a bursting shell. Pieces of the broken screen, smoke and dust filled the cockpit. Unperturbed, Wing Cdr. Roulston led his formation to the objective, which was heavily bombed.

Maj. J. E. PARSONSON, S.A.A.F., No. 5 Sqn.—On two occasions his aircraft has been shot down, but, displaying great fortitude, Maj. Parsonson succeeded in rejoining his squadron. In April he participated in an engagement during which a convoy of transport aircraft was destroyed off the Tunisian coast. A few days later he led a formation in an attack on a large number of similar aircraft over the Gulf of Tunis. During the action 20 of them were shot down, two being destroyed by Maj. Parsonson.

Act. Sqn. Ldr. R. P. BEAMONT, D.F.C., No. 609 Sqn.—Since January, 1943, Sqn. Ldr. Beamont has put out of action 13 locomotives and many lorries in determined attacks at night.

Bar to Distinguished Flying Cross

Act. Wing Cdr. P. M. BROTHERS, D.F.C.—Within recent months this officer has led a wing in many operations, and, by his skilful work and personal example, has contributed in a large measure to the high standard of operational efficiency of the formation.

Act. Sqn. Ldr. L. J. HODGES, D.F.C., No. 161 Sqn.—This officer has completed many sorties, achieving much success. He is an extremely efficient and gallant flight commander.

Sqn. Ldr. R. H. GIBBES, D.S.O., D.F.C., R.A.A.F., No. 3 (R.A.A.F), Sqn.—On one occasion, during an attack on an airfield at Bir Dufan, his aircraft was shot down. After walking for about 50 miles he was picked up by friendly forces and enabled to rejoin his squadron. Since then, Sqn. Ldr. Gibbes has taken part in many sorties. He has destroyed at least ten and damaged several other enemy aircraft.

Act. Sqn. Ldr. R. H. HARRIES, D.F.C., R.A.F.V.R., No. 94 Sqn.—In recent operations he has destroyed three enemy aircraft, shared in the destruction of another and damaged three more.

Sqn. Ldr. D. L. CARTRIDGE, D.F.C., No. 248 Sqn.—This officer has destroyed seven enemy aircraft during the numerous operational sorties which he has completed while serving with this squadron. He was awarded the D.F.C. in July, 1942, for good work in reconnaissance duties, and had by then destroyed one enemy aircraft.

Act. Sqn. Ldr. D. M. CROSSLEY, D.F.C., R.A.F.V.R., No. 70 Sqn.—During the advance after the battle of El Alamein, this officer completed a series of successful sorties, causing destruction among dispersed aircraft and motor transport. On other occasions, on sorties against Heraklion, Misurata and Palermo, he bombed the target with good effect and subsequently attacked ground installations with his guns.

Act. Sqn. Ldr. I. D. N. LAWSON, D.F.C., R.A.F.V.R., No. 70 Sqn.—In sorties directed against enemy transport, during the advance in November, Sqn. Ldr. Lawson completed a number of very successful attacks, causing much destruction, in the face of intense opposition, while lately, in attacks on the strongly defended airfield at Castel Benito and on the barracks at Mareth, he started fires and caused extensive damage to buildings.

Distinguished Flying Cross

Wing Cdr. D. P. D. G. KELLY, No. 255 Sqn.—Wing Cdr. Kelly is a skilful and courageous pilot who has achieved much success in fighting opera-

tions at night. He has destroyed three enemy aircraft.

Act. Wing Cdr. E. L. MILLINGTON, No. 225 Sqn.—This officer participated in operations in North Africa and displayed courage, keenness and devotion to duty worthy of high praise. His personal example and skilful leadership have contributed materially to the operational efficiency of the squadron he commands.

Act. Sqn. Ldr. E. L. BEVERELY, No. 13 Sqn.—This officer has completed twenty-nine sorties. He is a most efficient flight commander whose fine qualities and tireless efforts have proved inspiring.

Act. Sqn. Ldr. A. W. ELLER, R.A.F.V.R., No. 18 Sqn.—This officer has participated in twenty-nine sorties. During the campaign in North Africa he has undertaken many sorties both by day and night, often in difficult circumstances. On one occasion, during a daylight operation in December, 1942, his aircraft was hit and set on fire in an engagement against enemy fighters. Despite this, he effected a skilful forced landing. Undeterred by a trying experience, Sqn. Ldr. Eller quickly resumed operational flying.

Act. Sqn. Ldr. I. G. MACLAREN, No. 614 Sqn.—In operations in North Africa this officer took part in a number of successful sorties, many of them in bad weather and over difficult terrain. One night in February, 1943, he was detailed to execute a night bombing attack against enemy transport and troops in the Kasserine Pass. The weather was extremely bad with heavy clouds covering the mountains on either side. Despite this, Sqn. Ldr. MacLaren flew down the pass and successfully bombed the target.

Flt. Lt. G. HILL, R.C.A.F., No. 111 Sqn.—Flt. Lt. Hill is a skilful leader whose ability has been well in evidence during recent operations. He has participated in many sorties and has destroyed four enemy aircraft.

Kasserine Pass Patrol

Act. Flt. Lt. F. ROTHWELL, No. 13 Sqn.—On one occasion, during a bombing attack on Bizerta in daylight, his aircraft was attacked by an enemy fighter but, by skilful manœuvring, he evaded the attacker having sustained only slight damage to his aircraft. On another occasion, one night in February, 1943, he was detailed to patrol the Kasserine Pass and to bomb any mechanical transport in the vicinity. Whilst searching for objectives and flying at a low level his aircraft was hit by fire from the ground defences. A shell, which burst inside the aircraft, broke the rudder and tail trim controls. In spite of this, Flt. Lt. Rothwell continued his search and later bombed some transport. He flew the damaged aircraft to an airfield at Maison Blanche, where he effected a safe landing at the third attempt.

F/O. T. W. ALLEN, R.N.Z.A.F., No. 142 Sqn.—This officer has participated in twenty-eight sorties. His determination to press home his attacks from a low level, in the face of heavy fire from the ground defences, has been most praiseworthy.

F/O. E. H. BROWN, R.A.A.F., No. 682 Sqn. (since deceased).—This officer has completed 62 sorties, and has invariably displayed great skill and determination. This was amply demonstrated one day in April, 1943, when he successfully accomplished a reconnaissance flight over Naples and adjacent area in the face of heavy and accurate fire from the ground defences.

F/O. I. K. CRAWFORD, R.A.F.V.R., No. 111 Sqn.—He took part in many sorties over Northern France before operating in North Africa, where he has completed a large number of sorties. In attacks on transport and other targets on the ground he has achieved much success, while in air combats he has destroyed one enemy aircraft.

F/O. O. L. HARDY, R.N.Z.A.F., No. 72 Sqn.—This officer has completed 70 sorties, including a number in the campaign in North Africa. In air combat he has destroyed three enemy aircraft, while in low level machine gun attacks on enemy transport he has achieved success.

F/O. E. J HOLLOWAY, R.A.F.V.R., No. 18 Sqn.—At the commencement of the campaign in North Africa he took part in several daylight bombing sorties, and his steadfastness in the face of considerable opposition proved inspiring. On one occasion, in December, 1942, he skilfully force-landed his aircraft, which had been set on fire when attacked by a superior number of enemy fighters.

F/O. J. LE CHEMINANT, No. 72 Sqn.—This officer fought in the Battle of Britain, and afterwards took part in many sorties over Northern France. In operations in North Africa he has proved himself to be an excellent section leader. He has destroyed six enemy aircraft.

F/O. E. D. MACKIE, R.N.Z.A.F., No. 243 Sqn.—In operations in North Africa this officer has displayed skilful leadership and great tenacity. He has destroyed five enemy aircraft, four of them within a period of eleven days in April, 1943.

F/O. K. P. NEILL, R.N.Z.A.F., No. 225 Sqn.—This officer has undertaken many operational flights during the campaign in North Africa. On one occasion he undertook an important sortie which necessitated several runs over the target to obtain the desired results. In the face of heavy anti-aircraft fire F/O. Neill displayed great skill and coolness, and completed his task successfully.

P/O. J. D. AITCHISON, R.A.F.V.R., No. 150 Sqn. (since deceased).—One night in April, 1943, P/O. Aitchison and Sgt. Leckie were navigator and pilot of an aircraft detailed to bomb an enemy airfield. Whilst over the target area the aircraft was hit by anti-aircraft fire. One engine was disabled, the hydraulic systems were rendered unserviceable, while a serious leakage of petrol occurred. Despite this, Sgt. Leckie attempted to fly the aircraft to a landing ground, being greatly assisted by P/O. Aitchison. It was impossible to maintain height, however, and Sgt. Leckie gave order to abandon aircraft, but, by the time the other members of the crew had left by parachute, it was too late for him to follow. Nevertheless, he succeeded in effecting a crash-landing in a battle area. P/O. Aitchison, who had descended safely, immediately rushed to his comrade's assistance. Although under enemy fire, they took steps to prevent the crashed aircraft from falling into enemy hands.

Sqn. Ldr. H. B. VERITY, R.A.F.V.R., No. 161 Sqn.—Sqn. Ldr. Verity has participated in 118 sorties. He is a skilful pilot whose example of determination and devotion to duty have proved inspiring.

F/O. F. E. RYMILLS, D.F.M., R.A.F.V.R., No. 161 Sqn.—This officer has completed a large number of operations some of them of a very hazardous nature. He has displayed great determination and his successes have been worthily earned.

Group Capt P. C. Pickard, D.S.O., D.F.C., of "Target for To-night" fame, who has now taken over a Halifax station in the North. Group Capt. Pickard also commanded the Whitley squadron which dropped the paratroops for their raid on Bruneval.

P/O. P. J. O. BUCK, R.N.Z.A.F., and P/O. J. H. SYMONS, R.C.A.F., both of No. 75 (N.Z.) Sqn.—One night in April, 1943, P/Os. Buck and Symons were pilot and navigator respectively of an aircraft detailed to attack Duisburg. Whilst over the target area the aircraft was attacked by an enemy fighter and sustained much damage. The rear gunner was mortally wounded, while P/O. Symons was wounded in the hand. P/O. Buck succeeded in evading the attacker and set course for base. On the return flight the damaged bomber became difficult to control and, when one of the engines failed, the aircraft began to lose height. All movable equipment was jettisoned and, height being maintained, P/O. Buck flew the aircraft to base, where he effected a perfect crash-landing. During the return flight P/O. Symons, in spite of his painful injury, did all within his power to help his pilot, obtaining a number of fixes which proved of great assistance.

P/O. F. N. PLUM, R.A.F.V.R., No. 115 Sqn.—This officer has completed 24 sorties. In April, 1943, he piloted an aircraft detailed to attack Duisburg. Shortly after the take-off, engine trouble developed. Despite this, P/O. Plum continued his flight to the target, which he bombed successfully, afterwards flying the aircraft safely to base.

F/O. C. B. ANDERSON, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—One night in April, 1943, F/O. Anderson and Sgt. Fuhrman were navigator and pilot respectively of an aircraft detailed to attack Stettin. Whilst over the Baltic sea, the aircraft was repeatedly hit by fire from an armed ship. One engine was put out of action, the tail unit was damaged, restricting practically all rudder movements, while a shell penetrated the bomb bay, exploding amongst the incendiaries. F/O. Anderson was wounded in the thigh and buttock by splinters of shrapnel which entered his cabin. The situation was perilous but Sgt. Fuhrman decided to attempt to fly the damaged bomber home. Displaying superb airmanship and great endurance he eventually accomplished his purpose, flying the damaged bomber to an airfield in this country where he effected a masterly landing before collapsing at the controls. During the return flight, F/O. Anderson, despite his injuries, refused to leave his post and continued his navigational duties, rendering great assistance to his pilot.

Flt. Lt. M. A. J. PIERRE, R.A.F.V.R., No. 158 Sqn.—In air operations, this officer displayed courage and fortitude in keeping with the highest traditions of the R.A.F.

F/O. T. ARCHIBALD, R.A.A.F., No. 77 Sqn.—One night in April, 1943, this officer captained an aircraft which attacked Essen. Whilst over the target area the aircraft was repeatedly hit by fire from the ground defences, and one engine was put out of action. It was then discovered that one bomb had failed to release. F/O. Archibald made a second run over the target and released the bomb successfully. His aircraft sustained much damage, but he flew it back to base with one engine unserviceable.

F/O. J. G. WRIGHT, R.C.A.F., No. 112 Sqn.—This officer has taken part in a large number of sorties, including numerous fighter-bomber attacks against enemy airfields and mechanised transport. In air combat he has destroyed at least three enemy aircraft.

Act. Sqn. Ldr. F. MURPHY, R.N.Z.A.F., No. 486 (N.Z.) Sqn.—This officer is a skilful pilot. He has taken part in many determined attacks on shipping, while, in air combat, he has destroyed four enemy aircraft.

Flt. Lt. A. V. DUFFILL, R.A.F.V.R., and F/O. F. J. STARKIE, R.A.F.V.R., both of No. 487 (N.Z.) Sqn.—Early in May, 1943, Flt. Lt. Duffill, F/O. Starkie, and Sgts. Turnbull and Neill were pilot, navigator, wireless operator/air gunner and air gunner respectively of one of a formation of aircraft detailed to attack a target in Holland. Whilst crossing the enemy coast, the formation was intercepted by a large force of enemy fighters. In the combats which followed, Sgt. Turnbull coolly gave a commentary on the attackers' movements and later manned a position until he was seriously wounded. Sgt. Neill used his guns effectively, but was wounded in the legs by the enemy's fire, which also caused a fire to break out in the rear of the fuselage. F/O. Starkie, acting with great promptitude, quickly extinguished the flames. This accomplished, he tended his wounded comrade, Sgt. Turnbull, and rendered efficient first-aid after carrying him across a gaping hole, which had been torn in the fuselage. Meanwhile, Flt. Lt. Duffill was taking skilful evading action, while Sgt. Neill, despite his injuries, continued to engage the enemy until all attacks ceased. Flt. Lt. Duffill, displaying superb airmanship, eventually flew the badly damaged bomber to base.

Shipping Attacks

Act. Wing Cdr. G. H. B. HUTCHINSON, R.A.F.O., No. 235 Sqn.—This officer has commanded the squadron since July, 1942, and since then he has led a number of sorties against enemy shipping. In January, 1943, he led the escort for a striking force which sank a motor vessel off the Norwegian coast. On another occasion, while on a similar mission, one engine became unserviceable while the aircraft was flying almost at sea level. With great determination and skill, Wing Cdr. Hutchinson flew the aircraft safely to base.

Sqn. Ldr. P. M. J. EVANS, No. 69 Sqn.—This officer has completed 16 sorties from Malta, during which he has destroyed one enemy aircraft and attacked enemy shipping, airfields and transport. One night in January, 1943, he made a highly successful intruder patrol in Tripoli, bombing lorries and attacking road transport with cannon and machine-gun fire and causing numerous fires. Light anti-aircraft fire damaged the aircraft, severing the hydraulics pipe and severely wounding the observer. Despite this, Sqn. Ldr. Evans landed his aircraft, causing negligible damage. This landing was made at night and off the runway, thus ensuring continuous operations from base.

Act. Sqn. Ldr. J. N. DAVENPORT, R.A.A.F., No. 455 (R.A.A.F.) Sqn.—This officer has participated in attacks on some of the enemy's most heavily defended targets, including Hamburg, Essen and Dortmund; he has also taken part in minelaying operations. Early in September, 1942, he was captain of an aircraft which flew to a North Russian base and participated in a patrol over the Barents Sea.

Act. Sqn. Ldr. J. T. FREEMAN, No. 608 Sqn.—This officer has participated in a large number of shipping strikes along the Danish and Norwegian coasts and also in a successful low-level raid on Christiansand Harbour. Since November, 1942, Sqn. Ldr. Freeman has displayed great courage and determination during anti-submarine patrols in the Mediterranean.

Act. Sqn. Ldr. A. W. MCCANDLISH, No. 225 Sqn.—This officer has participated with success in a large number of tactical reconnaissance and bombing sorties during the campaign in North West Africa. His reconnaissance work has been extremely thorough and has produced valuable results.

Capt. P. A. HATSWELL, S.A.A.F., No. 21 (S.A.A.F.) Sqn.—As leading observer Capt. Hatswell has completed a tour of operational duty in the Middle East. Throughout he displayed unvarying devotion to duty and a high standard of efficiency.

Capt. D LIDDELL, S.A.A.F., No. 24 (S.A.A.F.) Sqn.—Capt Liddell has flown on a very large number of operational sorties Always cool and un-

ruffled, even in most trying circumstances, he has been particularly successful in making low-level attacks on enemy camps and transport.

Flt. Lt. R. W. ATKINSON, No. 680 Sqn.—Flt. Lt. Atkinson has participated in a large number of operational sorties and for the last four months has been in command of his flight. He has set a magnificent example of courage and determination.

Flt. Lt. B. S. E. BEATTIE, R.A.F.V.R., No. 104 Sqn.—At the commencement of his operational career, Flt. Lt. Beattie took part in eleven raids on Tobruk which were immediately followed by intensive operations during the Battle of Egypt. He also participated, from Malta, in a number of bombing sorties against well-defended targets.

Flt. Lt. E. BURDON, R.A.F.V.R., No. 40 Sqn.—Flt. Lt. Burdon has taken part in operations against targets in Libya, Crete and Tripolitania. A keen gunner, he always displays a fine fighting spirit.

Flt. Lt. J. D. CROFT, R.A.F.V.R., No. 462 (R.A.A.F.) Sqn.—This officer has taken part in attacks on many of the most heavily defended targets in Western Germany and North Africa, including Benghazi and Tobruk. He also participated in the three "1,000" bomber raids.

Flt. Lt. D. R. M. FURNISS, R.A.F.V.R., No. 541 Sqn.—This officer has successfully completed many long photographic reconnaissances, often in adverse weather and in the face of severe enemy opposition.

Flt. Lt. D. J. V. HENRY, R.N.Z.A.F., No. 93 Sqn.—Flt. Lt. Henry has shown outstanding keenness and initiative in organising operations which have caused much destruction among enemy ground forces and airfields. He has destroyed one enemy aircraft in the air and probably destroyed another, while several have been damaged. He has also secured valuable information about troop movements.

Flt. Lt. E. G. C. LEATHEM, R.A.F.V.R., No. 544 Sqn.—Flt. Lt. Leathem has been employed on photographic reconnaissance duties for the past eighteen months. He has always set a fine example of keenness and ability.

Flt. Lt. D. McGREGOR, R.A.F.V.R., No. 179 Sqn.—Since joining No. 179 Sqn. Flt. Lt. McGregor has taken part in twelve operational sorties. During this period his steadfast courage during night attacks on enemy U-boats has been an inspiration to his crew.

40-*minute Take-off*

Flt. Lt. L. J. BROWN, No. 277 Sqn.—Since October, 1942, Flt. Lt. Brown, who has been engaged in instructing air crews on the Walrus seaplane, has taken part in ten operational sorties and rescued six airmen. In January, 1943, this officer piloted an aircraft which rescued two members of an aircrew twenty-five miles off the East Coast. This was an exceptional performance involving alighting on a very rough sea with waves breaking over the aircraft, and necessitating a run of 40 minutes until the aircraft could take off.

Flt. Lt. G. B. MIEDECKE, R.A.A.F., No. 10 Sqn.—This officer has completed an exceptionally large number of operational flights, many of them of long duration. He has invariably performed his allotted tasks with courage, coolness and tenacity of purpose.

Flt. Lt. H. R. G. POULTON, R.A.F.V.R., No. 64 Sqn.—Flt. Lt. Poulton has completed a very large number of sweeps over enemy territory in the course of which he has destroyed at least two enemy aircraft and damaged others.

Flt. Lt. F. S. WILLS, No. 206 Sqn.—Flt. Lt. Wills, an excellent leader and captain of aircraft, has taken part in a large number of sea patrols. In July, 1941, he successfully attacked a U-boat in the Bay of Biscay; five days later he sighted and remained with the crew of a Hudson aircraft in a dinghy off the French coast until they were reached by a Sunderland aircraft. In December, 1941, whilst on the way to Iceland, this officer made a low-level machine-gun attack on a surfaced enemy submarine.

Flt. Lt. J. E. WILLSON, R.A.F.V.R., No. 219 Sqn.—This officer has destroyed five enemy aircraft during night fighting operations. He is an outstanding night fighter pilot who, on at least two occasions, has destroyed two enemy aircraft on a single night.

Act. Flt. Lt. B. A. COLEBORN, M.B.E., No. 24 Sqn.—Since August, 1942, this officer has led his squadron with conspicuous success and gallantry. His courage and fearless determination have always been of the highest order and have contributed in a large measure to the successes achieved.

Act. Flt. Lt. B. P. COLSTON, R.A.F.V.R., No. 225 Sqn.—This officer has led a number of bombing raids which have had highly successful results. On several occasions he had secured tactical information of great value while on reconnaissance flights, and has also repeatedly attacked enemy vehicles with good results.

Act. Flt. Lt. H. G. COOKE, R.A.A.F., No. 461 (R.A.A.F.) Sqn.—In September, 1942, this officer delivered an effective attack on an enemy submarine. Flt. Lt. Cooke has also attacked enemy shipping in the face of heavy opposition. On one occasion he assisted in the rescue of six members of an aircraft crew from a dinghy.

Act. Flt. Lt. T. A. EGERTON, R.A.A.F., No. 10 (R.A.A.F.) Sqn.—This officer was commissioned in November, 1941, and qualified as captain in January, 1942. Throughout his flying career he has invariably made the most of his opportunities to attack the enemy.

Act. Flt. Lt. H. C. GODEFROY, R.C.A.F., No. 403 (R.C.A.F.) Sqn.—This officer has, throughout his operational career, shown an exceptionally fine fighting spirit. Flt. Lt. Godefroy has destroyed two enemy aircraft. He has also shared in damaging three locomotives.

Act. Flt. Lt. E. L. HOWEY, R.C.A.F., No. 407 (R.C.A.F.) Sqn.—During the last year this officer has flown on a large number of bombing sorties, many of which were of a particularly hazardous nature. He has been responsible for the destruction of four enemy ships.

Act. Flt. Lt. J. C. KILPATRICK, R.A.F.V.R., No. 13 Sqn.—During the time of the German advance at Kasserine, when his wing was operating in very adverse weather, this officer by his keenness and determination, encouraged and inspired all. He has on several occasions located and damaged enemy transport, and on one occasion obtained a hit on a petrol train.

Act. Flt. Lt. C. J. H. LECOUTEUR, R.N.Z.A.F., No. 202 Sqn.—In February, 1943, this officer was flying as captain of aircraft on a mission against enemy submarines. A U-boat was sighted, but submerged before an attack could be delivered. Later the submarine was again sighted, and a very effective attack made.

Act. Flt. Lt. E. G. LLOYD, R.A.A.F., No. 458 (R.A.A.F.) Sqn.—During a sortie over Tobruk, his aircraft was seriously damaged by anti-aircraft fire, and he received three wounds. Despite the severe pain which he was suffering, he continued and bombed the target successfully.

Act. Flt. Lt. J. C. E. MACDONALD, R.A.F.V.R., No. 221 Sqn.—Flt. Lt. MacDonald has participated in many highly successful operations against enemy shipping over the Mediterranean Sea. On one occasion he suffered bad burns in the face and hands whilst endeavouring to save a wounded comrade from a burning aircraft.

Sqn. Ldr. E. W. Wootten, who has been awarded a Bar to his D.F.C.

Act. Flt. Lt. T. A. MCGARRY, R.A.F.V.R., No. 39 Sqn.—Flt. Lt. McGarry has completed 80 hours' operational flying since his arrival in Malta. He had previously completed many daylight torpedo strikes off the Norwegian coast. Fine results have been obtained from the sorties which this officer has completed in the Mediterranean. Over 34,500 tons of enemy shipping has been destroyed, in the face of strong opposition.

Act. Flt. Lt. K. A. H. MASON, R.A.F.V.R., No. 235 Sqn.—In April, 1943, this officer led a sweep, during which four Italian torpedo bombers were destroyed. He has personally destroyed one enemy aircraft and a flak ship.

Act. Flt. Lt. A. J. MOTTRAM, R.A.F.V.R., No. 489 Sqn.—During the past 12 months this officer has led numerous attacks against enemy shipping off the Norwegian coast. On three occasions he has been leader of formations which have attacked enemy transports with success.

Act. Flt. Lt. H. P. PETERS, R.C.A.F., No. 400 (R.C.A.F.) Sqn.—This officer has been engaged on operational flying since August, 1941. He has taken part in reconnaissances, shipping and low-level patrols.

Act. Flt. Lt. R. H. PRIOR, R.A.F.V.R., No. 458 (R.A.A.F.) Sqn.—Since joining this squadron in July, 1942, Flt. Lt. Prior has taken part in numerous operational sorties. On one occasion he located and attacked a large enemy merchant vessel. On another his aircraft was severely damaged by anti-aircraft fire, the engine instruments being rendered unserviceable. Flt. Lt. Prior flew it safely to base.

Act. Flt. Lt. J. L. STEELE, R.A.F.V.R., No. 114 Sqn.—This officer has taken part in numerous operational sorties over Germany and the Low Countries, as well as in North Africa. He has displayed great determination and courage in low-level attacks against roads and airfields. One night in December, 1942, after successfully bombing Bizerta airfield, he made a low level machine-gun attack from an altitude of 50 feet.

Act. Flt. Lt. E. C. STEWART, R.A.F.V.R., No. 104 Sqn.—This officer, who took part in the Battle of Egypt, has an excellent operational record, being noted for his coolness and good judgment when over the target. On several occasions during adverse weather, Flt. Lt. Stewart has located and bombed the target in the face of heavy opposition.

Act. Flt. Lt. H. N. SWEETMAN, R.N.Z.A.F., No. 486 (N.Z.) Sqn.—Flt. Lt. Sweetman has taken part in a great number of operational sorties, attacking both shipping and ground targets. This officer has personally destroyed at least two enemy aircraft.

SERVICE AVIATION

Distinguished Flying Medal

Sgt. J. C. LECKIE, R.C.A.F., No. 150 Sqn.—For citation see P/O. Aitchison, D.F.C.

Sgt. H. L. FUHRMAN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—For citation see F/O. Anderson, D.F.C.

Sgt. A. W. TURNBULL and Sgt. L. H. NEILL, both of No. 487 (N.Z.) Sqn.—For citation see Flt. Lt. Duffill, D.F.C., and F/O. Starkie, D.F.C.

Flt. Sgt. J. COCKBURN, No. 46 Sqn.—This airman joined the squadron in April, 1942, after eight months' service with another unit. He has been largely responsible for the record achieved by his crew in destroying four hostile aircraft at night in four combats.

Flt. Sgt. A. D. S. MARTIN, No. 179 Sqn.—Flt. Sgt. Martin has completed many hours' flying on anti-submarine patrols at night. His aircraft has damaged at least one submarine and probably more.

Flt. Sgt. E. W. SALMON, R.A.A.F., No. 142 Sqn.—Flt. Sgt. Salmon has taken part in a large number of operational sorties. One night in January, 1943, while over Bizerta, his aircraft was attacked by an enemy night fighter and badly damaged. This airman, by his technical skill, was of great assistance to his captain, thus enabling him to return safely to base.

Flt. Sgt. A. R. DOWNING, No. 600 Sqn.—On April 30, 1943, this airman piloted an aircraft engaged on patrol over an area of the Mediterranean sea. Shortly before dawn he observed five enemy transport aircraft. Flt. Sgt. Downing immediately attacked and, within four minutes had shot four of them down into the sea. He then engaged and destroyed the remaining aircraft. In achieving this spectacular feat, Flt. Sgt. Downing used only half of his ammunition.

Sgt. R. J. H. HUSSEY, No. 72 Sqn.—In operations North Africa this airman took part in a very large number of sorties, including attacks on airfields and road transport. He has destroyed at least four enemy aircraft in combat.

Sgt. W. F. HARRIS, R.C.A.F., No. 150 Sqn.—This airman is a steady, reliable and conscientious pilot, who has taken part in a large number of operational sorties over Germany, Italy and Tunisia.

Sgt. M. D. MUGGERIDGE, R.N.Z.A.F., No. 104 Sqn.—This airman has participated in numerous attacks on heavily defended targets, but in spite of anti-aircraft opposition which damaged his aircraft on three occasions, he has invariably flown it successfully to base.

Sgt. J. WEBSTER, No. 142 Sqn.—This airman has completed a large number of operational sorties with much success in his duties as air gunner. In July, 1942, Sgt. Webster's crew was detailed to attack Dusseldorf. Over the target area they were attacked by an enemy night fighter, which was shot down by Sgt. Webster.

Sgt. J. H. WINFIELD, No. 221 Sqn.—This airman has completed a large number of operational missions which have included air-sea rescue patrols and low-level attacks on enemy shipping in the Mediterranean. On several occasions he has had to make forced landings both in the desert and at sea, and once was in a dinghy for 4½ days.

Roll of Honour

Casualty Communiqué No. 250.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 103 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. W. J. Horne.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. H. H. Dominy; Sgt. A. J. N. Edwards; P/O. E. W. T. Gibbs; Sgt. G. Hebblethwaite; P/O. J. Leewarden; Sgt. R. W. Lovell; Sgt. A. E. Rees; Flt. Sgt. M. G. Savage; Sgt. F. V. H. Shepherd; Flt. Sgt. W. Stockport, D.F.M.; P/O. G. C. W. Stone; Flt. Lt. P. H. Tippetts-Aylmer, D.F.C.; P/O. D. G. Williams; Sgt. T. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. E. J. Andrews; Sgt. B. R. Anstee; P/O. R. Beaumont; Sgt. E. W. Bond; P/O. E. Booth; Sgt. R. H. Brash; Sgt. M. A. Brett; Sgt. D. G. Brimfield; Sgt. R. H. Callaghan; Sgt. A. H. Cameron; Sgt. P. H.

Corbett; P/O J. W. Corfield, D.F.M.; Sgt. J. C. Cubitt; Sgt. G. W. Davies; P/O A. C. R. Downward; Sgt. R. Easton; Flt. Sgt. H. G. Edwards; Sgt. M. A. E. Ennion; Sgt. L. P. D. Fordham; Sgt. J. E. Gallon; Sqn. Ldr. O. Godfrey; Sgt. R. G. Horne; Sgt. R. Howells; Sgt G. A. Hunt; P/O. D. J. Jones; P/O. R. T. Jones; Sgt. J. S. Kennedy; Sgt. R. Ketchell; Sgt. T. Lee; Sgt. W. E. Lindsell; Flt. Sgt. R. E. Little; Sgt. J. McCarten; Sgt. R. G. MacKenzie; Sgt. R. L. Miller; Sgt. J. B. Moore; Flt. Sgt. P. E. Neale; Act. Wing Cdr. R. H. Niven, D.F.C.; P/O. H. P. Palmer; Sgt. D. I. Parry; Sgt. T. H. G. Robinson; Sgt. E. A. Rudge; Sgt. P. H. Shulver; Sgt. I. D. Singer; P/O E. A. Smith; Sgt. A. R. Sparey; Flt. Sgt. E. B. Thomas; Sgt. N. Todd; Sgt. W. Weightman; Sgt. A. P. Westle; P/O. H. H. Whitehead, D.F.M.; Sgt. J. W. Williams; Sgt. R. C. Williamson.

WOUNDED OR INJURED IN ACTION.—Sgt. R. Drysdale; Flt. Lt. J. A. Rogers.

MISSING, BELIEVED KILLED IN ACTION.—Wing Cdr. G. E. MacDonald; F/O. H. P. O'Brien; Sgt. H. Thompson; F/O. J. R. Wilsdon.

MISSING.—Sgt. E. J. Ablewhite; Sgt. J. F. Atkins; P/O. D. W. Atter; Sgt. B. P. Ashcroft; Flt. Sgt. G. E. Barfoot; Sgt. H. L. Barnes; Sgt. R. H. Barnes; Sgt. E. W. J. Bennett; Sgt. C. N. Bonar; Sgt. R. Boydell; Sgt. L. T. Brett; Sgt. R. Brickles; Sgt. R. G. Bridge; Sgt. D. N. Brown; Sgt. H. G. Brown; Sgt. M. P. Brown; Sgt. S. C. Brown; Sgt. F. C. Brownlow; Act. Sqn. Ldr. J. C. Cairns, D.F.C.; Sgt. A. W. Clark; Sgt J. Clegg; Sgt. D. W. A. Crowley; Act. Flt. Lt. W. E. Davey; Sgt. F. W. Davies; Sgt. C. K. Davis; Sgt. N. M. Douglas; Sgt. C. W. S. Downes; Sgt. G. Elsworthy; P/O. T. E. Emberson; Sgt. L. A. Fisher; P/O. N. D. Fleming; Sgt. A. Forster; Sgt. W. N. Forth; Flt. Sgt. W. E. Freeman; Sgt. R. E. Funnell; Sgt. P. D. Gibbs; Sgt. G. J. Glare; Sgt. E. G. Goodfellow; Sgt. R. C. Grant; P/O. D. Grimshaw; Sgt. F. Guy; Sgt. J. L. Haddon; Sgt. L. Hainin; Sgt. G. J. C. Hall; Sgt. P. F. Hamberger; P/O. G. F. Heathcote-Peirson; Sgt. D. R. Higgs; Flt. Sgt. G. A. Hinshelwood; Sgt. W. A. Hollett; Sgt. K. G. Horne; Sgt. J. T. Hounsell; F/O. B. P. M. Hyland; Flt. Sgt. S. P. Jenkins; Sgt. B. B. Jones; Sgt. I. B. Jones; Sgt. B. F. Keable; P/O. W. C. Lambie; Flt. Sgt. R. T. Lang; F/O. R. H. Larkins; Sgt. N. Law; Sgt. C. W. E. Leach; Sgt. A. C. Leppard; P/O. L. E. Lindsay; Sgt. E. G. Litchfield; Sgt. C. Lowis; Sgt. W. McDonough; Sgt. W. Mapley; Sgt. N. Marshall; Sqn. Ldr. R. S. May; Sgt. P. E. Mellish; Sgt. V. C. G. Moody; Sgt. F. Moore; Sgt. P. W. J. Morrow; Sgt. H. G. Mugridge; Sgt. J. J. O'Neill; Sgt. E. A. Pye; Sgt. K. E. Rabbett; Sgt. J. M. Randall; Sgt. B. H. Reeve; Sgt. F. N. Robinson; Sgt. G. A. Rodway; Sgt. I. P. N. Rushton; Sgt. G. Rutherford; Sgt. H. W. Sawkings; Sgt. J. P. Sillitoe; Sgt. F. N. Slingsby; Sgt. J. M. J. Smith, D.F.M.; Sgt. L. A. Smith; Sgt. W. C. Snook; P/O. R. C. Stewart; Sgt. E. J. Tassell; Sgt. R. H. Taylor; Sgt. G. K. Thompson; Sgt. C. E. Thorpe; Sgt. W. A. Timms; F/O. T. C. Timney; Sgt. L. G. Webster; Sgt. J. R. Wells; Sgt. R. F. Whitaker; Sgt. J. Wood.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. C. F. Archer; F/O. A. R. Kingsley; Sgt. D. A. K. Treble.

KILLED ON ACTIVE SERVICE.—Sgt. V. E. Betterton; Sgt. J. Chisnall; Sgt. R. Deacon; Act. Sqn. Ldr. H. G. Edwards, D.F.C.; Sgt. R. B. Knight; Sgt. D. A. Street; Sgt. A. W. Oakley; Sgt. H. Rowbottom.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. R. P. Collins; Sgt. R. Duckworth.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. S. J. Robinson.

DIED ON ACTIVE SERVICE.—Sgt. R. W. Carlton; A/C.1 J. B. T. Cooper; L.A/C. F. A. Dackombe; L.A/C. W. A. Garrett; A/C.1 A. R. E. Lewis; Sgt. A. W. Pate; L.A/C. W. Ross; F/O. P. Scott, A.F.C.; L.A/C. R. T. Smith; Sgt. E. Sunderland; A/C.2 J. K. Taylor.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Act. Flt. Lt. C. A. Harrap.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 M. M. Richards.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. K. H. England; Sgt. M. M. Fitzgerald; Sgt. V. J. Gallogly; Sgt. E. L. Hynd; F/O. W. D. Love; Sgt. W. H. Sams; Sgt. H. M. Spence; Sgt. J. M. Synnott; P/O. W. K. Williams.

MISSING.—Sgt. J. C. Bell; Sgt. E. C. Ebbot; Sgt. E. H. Finch; Sgt. E. R. King; P/O. J. D. Pye; P/O. N. F. Robertson; Flt. Sgt. L. H. Watters; Sgt. J. N. Williams.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. W. W. Bull.

KILLED ON ACTIVE SERVICE.—Sgt. R. B. Douglas.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. J. S. Holder; P/O. R. R. Mayze; Flt. Sgt. A. J. Newman.

SERVICE AVIATION

Royal Canadian Air Force

KILLED IN ACTION.—F/O. A. S. Flemington; Sgt. F. Robertson; Sgt. S. C. F. Summers.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. C. S. Lenover; Flt. Sgt. E. A. Mullie.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. L. Baltser; P/O. D. H. Bootsma; Flt. Sgt. W. Cameron; Flt. Lt. C. T. Cantrill; Flt. Sgt. J. M. Dutton; Flt. Sgt. J. M. W. Fortin; P/O. A. L. Fraser; P/O. F. A. G. W. Gerty; Flt. Sgt. C. F. McCaw; Sgt. N. Macdougall; Flt. Sgt. E. F. B. Mandin; Flt. Sgt. C. S. Neven; P/O. J. J. Reilly; Flt. Sgt. W. R. Rice; Sgt. E. E. Sykes; Flt. Sgt. N. Williamson; Sgt. E. A. Young.

Flt. Sgt. A. B. Downing and Sgt. J. Lyons—pilot and observer of the Beaufighter which shot down five Ju 52s in quick succession near Cagliari. The D.F.M. has been awarded to Flt. Sgt. Downing. The official citation appears on page 52.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. R. Cornwall; P/O. J. D. Ferguson; Act. Flt. Lt. G. Low; P/O. J. P. Wheeler.

MISSING.—Sgt. J. G. Acker; Sgt. J. V. Agate; Sgt. J. A. L. Allan; F/O. L. J. Ashburner; Act. Flt. Lt. C. M. S. Awad; Sgt. J. W. Carley; P/O. S. J. Flannery; P/O. E. A. Foster; P/O. C. W. Gebhard; Sgt. J. Gillespie; Sgt. R. R. Gourde; Sgt. S. Hanan; Sgt. A. Jaynes; Sgt. T. E. Lavallee; Sgt. F. S. Lane; Sgt. W. MacK. Manson; P/O. H. B. Minnis; P/O. W. G. Monk; Sgt. A. S. Morrison; Sgt. L. J. C. Murphy; Flt. Sgt. J. M. B. O'Connor; Sgt. J. L. Peck; F/O. A. E. Pourbaix; Sgt. R. E. Powis; F/O. S. M. Pozer; Flt. Sgt. F. H. Purchase; Sgt. K. E. Radcliff; Sgt. G. K. A. Smallwood; Sgt. H. V. Smith-Jones; Sgt. F. T. Stanley; Sgt. C. C. Strain; P/O. A. E. Taylor; Act. Flt. Lt. W. L. Turner; F/O. C. J. L. Valliancourt; F/O. B. V. L. Veira; Sgt. D. H. Waugh; F/O. B. J. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. P. Skoblack.

DIED ON ACTIVE SERVICE.—L.A/C. F. Langdale.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. L. M. Edyvean

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. P. P. Hayes.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. S. Christie; P/O. N. P. Morse; Sgt. S. H. Mortimore.

MISSING.—P/O. R. F. Elliott; Sgt. D. G. McNab; F/O. D. R. Scrymgeour.

KILLED ON ACTIVE SERVICE.—Sgt. F. H. Brown.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. M. P. Angland.

South African Air Force

WOUNDED OR INJURED IN ACTION.—Lt. R. R. Lock; Lt. D. E. Tarr.

MISSING.—Maj. J. E. Parsonson.

Casualty Communiqué No. 251

Of the names in this list 108 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. D. B. Elliott; Act. Flt. Lt. D. N. Gallai-Hatchard.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. N. W. J. Coldrey; Sgt. M. D. Gorton; Sgt. F. N. Hadley; Flt. Sgt. J. S. A. Hodge; Sgt. S. C. Holden; Flt. Sgt. R. James; Flt. Sgt. G. Pudney, Sgt. K. R. Toller; Sgt. G. Walder.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. A. Bowyer; Sgt. J. L. Brydon; Sgt. E. E. Cheetham; Sgt. H. Clark; Sgt. E. H. Cooper; Flt. Lt. J. Dawson; Sgt. D. F. Dobson; Sgt. G. C. Falconer; P/O. H. Fallas; Sgt. G. L. Ferry; Flt. Sgt. J. Fleming; Sgt. T. H. Freestone; F/O. M. G. Grant; Sgt. W. Hallyburton; Sgt. F. Hamer; Sgt. H. J. Hannaford; P/O. L. B. Heward; Sgt. T. Hepple; Sgt. G. C. J. Heywood; Flt. Sgt. W. E. Hughes; Sgt. H. L. Jewell; Act. Wing Cdr. D. A. Keer, D.S.O.; Sgt. W. A. E. King; Sgt. J. C. McKellar; Sgt. E. Marsden; Sgt. L. G. Millar; Sgt. E. Mitchell; Sgt. R. G. Nicholls; Flt. Sgt. W. Oswelton; Sgt. R. A. Parsons; P/O. J. D. Peel; P/O. W. P. Raffan; Sgt. J. A. Rice; P/O. G. L. Stanlar; Sgt. J. G. L. Strain; Sgt. W. P. Taylor; Sgt. F. A. W. Thorne; Sgt W. S. Warren; Sgt. E. F. Wellare; F/O. L. C. Williams; Sgt. R. V. Willshire; P/O. D. G. Wilmer; Flt. Sgt. P. J. Withers; Sgt. E. Wright.

WOUNDED OR INJURED IN ACTION.—Sgt. W. H. J. Harbottle; F/O. D. Haywood; F/O. L. A. Quevatre.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. F. J. Bowles; Sgt. A. P. Deighton; Sgt. R. C. M. Douglas; Sgt. G. F. Fletcher; P/O. E. G. Francis; Sgt. E. T. D. Hardee; Sgt. J. A. Hawkins; F/O. G. L. Hicks; Sgt. A. Luke; Sgt. T. Pearson; Sgt. F. T. Pratt; Sgt F. Taylor; Sgt. R. Watson; Flt. Sgt. R. Watson; Sgt. J. B Watt.

MISSING.—Sgt. A. G. Allwright; P/O. D. G. Bentham; P/O. E. Booth; Sgt. J. S. Boyce; Sgt. J. R. Boyes; Sgt. A. J. Britton; Flt. Sgt. T. Bullock; Sgt. J. Bryant; Sgt. G. Burgess; Sgt. R. J. Chapman; F/O. G. D. Chippendale; Sgt. R. F. Cocking; Sgt. K. B. Cooke; Sgt. G. Cooper; Sgt. E. D. Curling; F/O. R. Deere; P/O. R. A. Dorsett; Sgt. F. J. Earle; Sgt. R. G. Edwards; P/O. C. P. Ellis; Flt. Sgt. W. H. Ellis; Sgt. G. Fisher; F/O. R. I. Fraser; Sgt. C. B. Freeman; Sgt. B. Y. Ginn; Sgt. E. R. Ginn; Sgt. R. E. Hardingham; Sgt. S. Hawkins; Flt. Sgt. J. G. Hibbert; Sgt. I. A. M. Holloway; Sgt T. H. Hornbrook; Sgt. H. D. Houghton; Flt. Sgt. H. Hudson; Sgt. B. H. James; Sgt. R. M. Jay; Flt. Lt. I. S. Jenks; Sgt. F. L. O. Kelly; Sgt J. N. Kelsall; Sgt. W. Kinniburgh; Flt. Sgt. J. T. Knox; Flt. Sgt. M. H. Lamont; Sgt. V. G. Leak; F/O. I. F. Mackenzie; Sgt. B. C. Marling; Sgt. C. Maurice; Sgt. B. W. Miller; Sgt. P. B. Mills; F/O. C. N. Millward; Sgt. W. Morton; P/O. J. L. Mouatt; Flt. Sgt. F. E. O'Hare; Flt. Sgt. J. S. Patman; Sgt. A. L. W. Pond; Act. Flt. Lt. T. R. Poynton; Sgt. E. G. Quick; Sgt. J. L. Readman; Flt. Sgt. A. W. Richmond; Sgt. R. Ronald; Sgt. W. Scott; Sgt. F. Sheppard; Sgt. A. A. Smithdale; Sgt. F. A. Solly; Sgt. W. H. Stacey; Sgt. F. C. Swain; Sgt. G. A. R. Town; Sgt. L. Turvey; F/O. A. Urquhart; F/O. P. A. Walker; Sgt. C. Warburton; Flt. Sgt. D. A. Watkins; Sgt. A. Wheatley; Sgt. H. J. K. Wheeler; Sgt. E. D. G. White; Sgt. H. E. Williams; Sgt. C. A. Willis; Sgt. J. Wilson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. A. Chambers; F/O. J. E. Tickler.

KILLED ON ACTIVE SERVICE.—Sgt. E. F. Banks; Flt. Sgt. K. A. Davies; Sgt. H. Derbyshire; Sgt. D. Driscoll; Sgt. R. C. C. Findley; Sgt. S. E. B. Gillam; Sgt. K. A. Hammond; Sgt. W. M. R. Lloyd; P/O. A. L. Pollard; Sgt. C. M. Thompson; F/O. E. G. L. Thompson; Sgt. D. C. W. Watkins; W/O. R. Worthington.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. T. Dean; P/O. R. H. Pike; Flt. Lt. C. F. Turner.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. F. Chapman; Sgt. K. J. Gill; Sgt. A. J. McHardy.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. R. W. Cumbers; Cpl. W. G. McKay; L.A/C. W. Parker; L.A/C. C. E. Saundons.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. W. R. Essex.

DIED ON ACTIVE SERVICE.—Cpl. G. T. Atkinson; L.A/C. C. W. Baker; L.A/C. T. Boan; L.A/C. D. Croker; A/C.2 G. W. Davidson; A/C.1 F. Dawson; L.A/C. E. A. Dent; L.A/C. C. Grove; L.A/C. R. Hogarth; L.A/C. M. Jacobson; A/C.2 J. W. Janes; L.A/C. D. Keith; A/C.1 T. Kinnaird; L.A/C. E. R. Lister; Sgt. J. E. Maldrem; A/C.1 C. A. Maycock; L.A/C. T. J. Merricks; Cpl. E. J. Paget; L.A/C. P. T. R. Spry; A/C.1 M. J. J. Staley; A/C.1 R. Swain; L.A/C. J. R. Watts; Cpl. J. D. Willoughby.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. R. O. Sandell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. M. L. Glenton-Wright; Flt. Sgt. M. E. Whitehill.

MISSING, BELIEVED KILLED IN ACTION.—Act. Flt. Lt. J. A. Hamlet.

MISSING.—Sgt. D. N. Dawson; F/O. R. E. Dollar; Sgt. R. S. King; Flt. Sgt. R. B. McIlroy; Sgt. P. M. Mackenzie; Sgt. W. F. Pridgeon; Sgt. W. S. Sinclair; Flt. Sgt. A. St. C. Turner.

KILLED ON ACTIVE SERVICE.—P/O. A. O. G. Richards.

PREVIOUSLY REPORTED MISSING, NOW PRE-

SERVICE AVIATION

SUMED KILLED ON ACTIVE SERVICE.—Sgt. R. E. Warren.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. H. R. Bacon; Flt. Sgt. L. V. Fletcher; Flt. Sgt. R. M. Long; Flt. Sgt. E. P. Povey.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. A. W. Hyson; Sgt. C. E. Le Blanc.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. L. A. M. Cauchy; Sgt. W. McL. Crane; Flt. Sgt. D. Cranswick; W/O. J. W. Daubner; Flt. Sgt. M. A. Fawcett; Flt. Sgt. J. C. Fitzgerald; Sgt. J. B. Fleming; Act. W/O. T. W. Hare; Sgt. W. R. C. Johnston; P/O. H. M. Lacelle; Flt. Sgt. G. H. Lyons; F/O. D. S. MacLean; Flt. Sgt. G. R. Montgomery; P/O. D. G. Morris; Flt. Sgt. G. McL. Phillips; P/O. W. A. Shoemaker, D.F.C.; Sgt. G. B. Tatham.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. G. Hume; Flt. Sgt. J. D. Steele.

MISSING.—Flt. Sgt. T. L. Bentley; Sgt. D. E. Crockatt; F/O. C. B. Dixon; Sgt. M. R. Dixon; Sgt. F. J. Duffy; Sgt. J. C. Eyre; Sgt. O. K. Glascock; P/O. J. R. Gaudet; F/O. D. B. Henderson; Sgt. C. R. D. Hurley; Sgt. T. A. McDowell; Flt. Sgt. J. R. Marriott; Sgt. R. Mucklow; Sgt. E. L. Newburg; Sgt. I. A. Penner; Sgt. A. E. Prime; F/O. J. R. Rebbetoy; Flt. Sgt. S. Sleeth; Sgt. W. M. Spafford; Sgt. J. L. Stordy; Flt. Sgt. F. L. Trovillo.

KILLED ON ACTIVE SERVICE.—W/O. E. D. R. Botten; P/O. H. B. Elliott; Sgt. L. E. Lightheart; Sgt. J. O. Munro; Sgt. W. Sprowell; Sgt. W. C. Scott; Sgt. K. R. Stratton.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. R. B. Henry.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. A. Post.

DIED ON ACTIVE SERVICE.—Flt. Sgt. N. R. Thompson.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. M. Darling; Sgt. M. C. Fell; Sgt. T. P. Hurley; Sgt. J. Inskip; Sgt. W. A. O'Malley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. Booth; Sgt. D. W. Cross; P/O. H. D. J. Fitzsimons; Sgt. D. L. G. Millar; Sgt. N. H. Rowe; Sgt. R. R. T. Sleep; P/O. J. A. Sligo; P/O. J. G. Stewart; Sgt. A. C. Williamson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. T. Cobb.

MISSING.—Act. Flt. Lt. G. I. Ellis; F/O. D. I. McNarey; Sgt. I. C. Salt; P/O. A. G. Tolley; Sgt. F. W. Upton.

KILLED ON ACTIVE SERVICE.—Sgt. N. L. Pittendrigh.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. T. G. Sullivan.

South African Air Force

KILLED ON ACTIVE SERVICE.—2/Lt. L. R. Richardson.

Casualty Communiqué No. 252

Of the names in this list, 105 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. J. W. Bagley; Sgt. P. Bigg; W/O. R. Obee; Sgt. J. A. Simpson; Sgt. W. F. Swift; Sgt. J. I. Thomas.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. E. C. Allen; Sgt. T. Bickers; P/O. R. E. Clark, D.F.M.; Sgt. A. E. Johnson; Act. Sqn. Ldr. P. Nixey, D.S.O.; Sgt. M. Rowbottom; Sgt. H. V. Winch.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. D. Balmer; Sgt. J. E. Bellamy; Sgt. T. C. Bird; Sgt. E. A. Blake; Sgt. W. J. Bratt; Flt. Sgt. J. H. Brooks; Sgt. F. V. Clayton; Sgt. J. Collie; Sgt. J. E. Cook; P/O. J. L. Crisp; P/O. R. J. Cussen; Flt. Lt. B. M. Denny; Sgt. G. T. Edwards; Sgt. R. J. Emms; Sgt. J. F. V. Ford; P/O. W. K. Ford; Sgt. D. E. Gwynn; Sgt. C. W. Hector; Act. Sqn. Ldr. C. E. Hill, D.F.C.; Sgt. C. A. Holmes; Sgt. C. B. Horne; Sgt. H. Huddless; Flt. Sgt. F. D. Jago; Sgt. W. E. James; Sgt. S. A. B. Kellie; Flt. Sgt. T. L. Kennedy; Sgt. W. G. Kennedy; Sgt. J. R. Martin; Flt. Sgt. G. T. Mantle; P/O. A. Maxwell; Sgt. D. A. Melville; Sgt. S. J. Morgan; Sgt. R. S. Oliver; P/O. A. H. Patrick; Sgt. W. E. Pearson; Sgt. F. B. Pomeroy; W/O. K. Railton; Sgt. T. A. Reid; Sgt. C. C. Ridgway; Sgt. A. L. Ridings; Sgt. R. R. Rutland; Sgt. E. C. Sanders; Sgt. G. Scully; W/O. W. B. Sharp; Flt. Sgt. J. A. Shaw; Sgt. B. E. Smith; Flt. Lt. D. H. V. Smith; Sgt. W. B. Smith; Sgt. R. W. Stewart; Flt. Sgt. B. G. Stretch; Sgt. S. Topham; Sgt. T. W. Walker; Sgt. W. D. Warburton; L.A/C. A. E. Wright.

WOUNDED OR INJURED IN ACTION.—Sgt. E. D. F. Hine; Sgt. L. H. Neill; Sgt. A. W. Turnbull.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. M. F. Weir.

MISSING, BELIEVED KILLED IN ACTION.—F/O. A. N. Adams; Sgt. T. J. Daley; Sgt. N. Harris; Sgt. J. Hayhurst; F/O. E. A. Legrand; Sgt. J. C. Lilley; F/O. L. Meakin; Sgt. A. D. Nicholson; Sgt. M. D. Peters; Sgt. A. Segal; F/O. D. I. Vise.

MISSING.—Sgt. J. E. Addison; P/O. T. Armstrong; Sgt. K. E. Bannister; F/O. E. W. Barnes; Sgt. K. K. Bell; Sgt. F. H. Bennetton; Flt. Lt. G. F. Berridge; Sgt. E. K. Blackwell; Sgt. J. A. Bland; Sgt. J. A. Bolton; P/O. D. J. Brown; Sgt. K. Brown; P/O. R. Brown; Sgt. J. K. Campbell; F/O. B. Carey; Act. Wing Cdr. J. H. D. Chapple; P/O. H. G. R. Chiverton; Sgt. A. W. Cochrane; Sgt. S. W. Cowham; Sgt. R. J. M. Cox; Flt. Sgt. D. E. Cruse; Sgt. A. J. Davies; F/O. R. J. H. Drummond; Sgt. R. H. Dunstan; Sgt. J. G. S. Dutton; Sgt. A. E. J. Eaton; Sgt. T. E. Ellingham; Sgt. K. F. Erne; Sgt. V. D. Farmer; Sgt. A. A. Fitzpatrick; Sgt. H. S. Flowerday; Sqn. Ldr. J. B. Flowerdew; F/O. L. Foulds; Sgt. F. G. R. Gibbs; Sgt. H. G. Graham; P/O. D. E. Grant; Sgt. W. A. Griffiths; P/O. C. J Hamment; Sgt. W. Harkness; Flt. Sgt. L. W. G. Head; Act. Flt. Lt. R. Y. Higginson, D.F.M.; Sgt. R. Hillary; Sgt. H. S. Hobbs; Sgt. A. M. James; Sgt. G. W. C. James; Sgt. H. Jenkins; Sgt. A. Jenkinson; Sgt. W. T. Jones; Sgt. W. D. Keen; F/O. H. J. King; Sgt. A. H. Law; Sgt. L. H. Leaney; Sgt. W. T. Leatherly; Sgt. B. Legg; Sgt. M. Leonard; Sgt. E. Lewis; Sgt. N. Long; Sgt. W. Lowery; Sgt. R. W. Lynn; Sgt. C. D. Mackelvie; Sgt. G. L. K. McCallum; Sgt. P. McNulty; Sgt. W. C. Marsh; Sgt. P. A. K. Mockford; Sgt. H. Munnery; Sgt. P. T. Murphy; F/O. C. V. Parsloe; Sgt. D. W. Payne; Sgt. A. E. Prain; Flt. Lt. A. S. W. Prioleau; W/O. K. R. Rees; Sgt. T. Rich; Sgt. G. H. Rogers; Sgt. G. Rose; Sgt. E. Routh; Sgt. L. A. W. Sanders; F/O. J. W. Scott; W/O. R. C. Sherrington, D.F.M.; Sgt. J. Short; Sgt. J. T. Smith; Sgt. G. H. Southam; Sgt. J. Staniforth; Sgt. R. A. Storey; Sgt. D. Stowe; Sgt. G. Sutton; Flt. Sgt. J. T. Taylor; Sgt. B. E. Taylor; Sgt. P. E. Tiller; P/O. J. M. Traynor; Flt. Sgt. L. Turner; Sgt. J. Utterson; Sgt. H. H. Wensley; F/O. T. C. Wheelhouse; Sgt. B. C. J. White; Sgt. J. Willatt; L.A/C. R. Wilkes; F/O. E. T. Williams; Sgt. E. Willis; P/O. J. F. L. Wise.

KILLED ON ACTIVE SERVICE.—Sgt. R. W. Anderson; P/O. G. P. Boswell; Sgt. S. D. Cameron; L.A/C. T. W. A. Cremen; Sgt. R. W. Dupen; Sgt. J. O. Eaves; Sgt. H. O. Foster; Sgt. E. S. Frostwick; A/C.1 F. E. Hirst; Sgt. T. Holden; L.A/C. J. Lee; Sgt. G. T. Lydford; Sgt A. Macintoch; F/O. R. H. McK. Martin; Sgt. J. M. Mathie-Morton; Sgt. S. Pitcher; Sgt. N. E. Reilly; L.A/C. F. McK. Robertson; A/C.2 E. M. Rogers; Sgt. R. D. Smith; L.A/C. G. W. Wale; A/C.2 J. Wright.

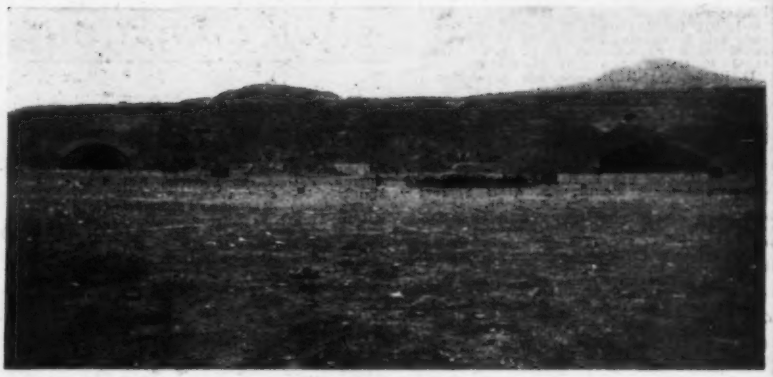
PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. H. Yeo.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. M. Alexander; Sgt. K. W. Blyth; P/O. C. de C. Findlay; Sgt. C. M. Leaver; P/O. A. Pickles; Flt Sgt. H. M. J. Powell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. E. H. Ashby; Sgt. C. A. Brown; Cpl. R. Greet; L.A/C. F. B. W. James; Act. Flt. Lt. J. R. Ross; Sgt. D. F. Smith.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. H. R. A. Newman.

DIED ON ACTIVE SERVICE.—A/C.1 A. Dale; Flt. Lt. G. A. Houghton; F/O. J. A. Hughes-Rees, D.F.M.; L.A/C. E. J. Kite; A/C.2 A. Smith; A/C.1 C. E. E. Smith; L.A/C. R. Webber.



The bomb-proof underground hangars of the *Regia Aeronautica* on Pantellaria. Thousands of troops used them as shelters during the final bombing.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. E. A. M. Deignan; P/O. G. A. Phillips.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. F. G. Bower Sgt. C. Brennan; Sgt. J. N. Dean; Sgt. A. E. Cooper; Flt. Sgt. R. A. Drew; F/O. D. C. Gibson; Flt. Sgt. A. D. Harris; Sgt. H. H. Harris; Sgt. J. R. James; Sgt. J. M. Lefrey; Sgt. R. D. Powell; P/O. G. P. Windsor.

WOUNDED OR INJURED IN ACTION.—Sgt. F. G. Matthews.

MISSING, BELIEVED KILLED IN ACTION.—P/O. R. B. Hudson.

MISSING.—P/O. H. T. Freeman; P/O. R. F. Westwood.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. H. Swanson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. J. Hehir.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. G. G. Pattearson.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. C. D. Alder.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. J. L. Fournier; Sgt. T. R. Taylor; Sgt. G. R. Yeates.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. H. B. Barber; Flt. Sgt. F. Bradley; Sgt. E. F. Bradley; Sgt. G. M. Drennan; Sgt. J. D. Drennan; Flt. Sgt. F. F. Duff; Sgt. J. A. Foran; P/O. T. E. E. Keyes; P/O. H. R. Millichamp; Flt. Sgt. J. G. Morrison; Sgt. N. M. Oulster; Sgt. A. J. Pottle; P/O. G. G Retallack; F/O. R. White.

WOUNDED OR INJURED IN ACTION.—Sgt. J. U. V. A. Limoges.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. E. J. A. Robert.

MISSING.—Flt. Sgt. K. H. Buck; P/O. B. A. G. Campbell; Sgt. G. Tyler; Sgt. A. C. Weir.

KILLED ON ACTIVE SERVICE.—Sgt. A. H. Leuty; P/O. W. Raets.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. P. Brown; Sgt. A. Glass; Sgt. J. W. Regan.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. J. C. Donald.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. N. E. McKee.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. N. E. Stone; Sgt. A. J. Tanner.

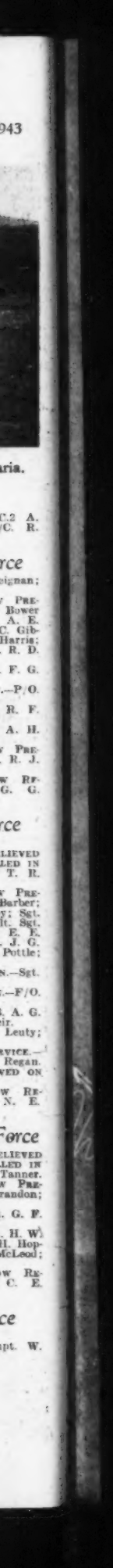
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. J. Brandon; Sgt. W. J. Gray.

WOUNDED OR INJURED IN ACTION.—Sgt. G. F. Whitwell, D.F.M.

MISSING.—Sgt. T. S. E. Bennett; P/O. R. H. W. Bentley; Sgt. J. McL. Boswell; F/O. W. H. Hopkins; Sgt. E. H. R. Lamb; Sgt. W. M. McLeod; F/O. S. B. Perryman.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. J. C. F. Leaning.

South African Air Force

MISSING.—2/Lt. D. Q. Quillam.

KILLED ON ACTIVE SERVICE.—Act. Capt. W. Hughes; Flt. Off. V. Z. Van Heerden.